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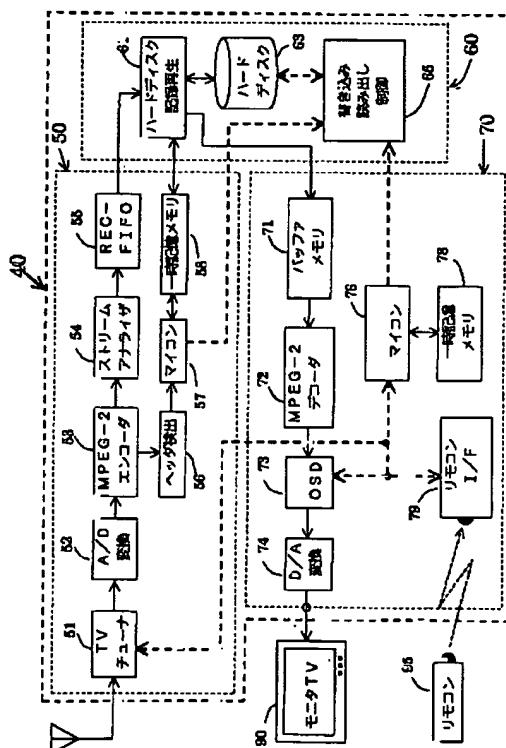
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(54) 【発明の名称】 映像信号の記録再生方法、及び映像信号記録再生装置

(57) 【要約】

【課題】 ハードディスクなどの記録媒体に符号化した映像信号を記録し、記録直後の信号を再生し、遅延した映像により視聴するに際し、視聴者が自然な感覚でチャンネル切り換え操作を行える記録再生装置を実現することにある。

【解決手段】 供給される映像信号を符号化器53により符号化して記録媒体63に記録し、記録直近の信号から過去に記録した信号までをスムーズな時間スイープにより再生する機能を有した映像信号記録装置における受信チャンネルの変更を、変更操作がなされたときは、変更前チャンネルの映像信号を続けて表示すると共に、チャンネル変更処理中であることを示す情報をオンスクリーンディスプレイ73により多重して視聴者に伝達し、復号器72により正常な映像信号が得られた後にその映像信号を表示機に表示するようにして実現した。



【特許請求の範囲】

【請求項1】設定された受信チャンネルを受信して得られる映像信号をランダムアクセス可能な記録媒体に記録すると共に、記録された直後の前記映像信号を再生する映像信号の記録再生方法において、前記受信チャンネルが変更操作されたときに受信チャンネル変更信号を生成する第1のステップと、その第1のステップにより生成された受信チャンネル変更信号が得られたときは、受信チャンネルの変更操作前に前記記録媒体に記録された受信チャンネル映像信号、及び／又は受信チャンネルを変更中であることを示す情報に係る変更中映像信号を出力信号として供給する第2のステップと、その第2のステップにおける変更中映像信号に続けて、受信チャンネルの変更操作後の前記記録媒体に記録、及び再生して得られる受信チャンネル映像信号を出力信号として供給する第3のステップと、を少なくとも有することを特徴とする映像信号の記録再生方法。

【請求項2】前記第2のステップは、受信チャンネル変更操作前の受信チャンネル映像信号を所定時間動画信号として供給して後に、前記受信チャンネル映像信号より生成したポーズ画像信号を供給するようになすることを特徴とする請求項1記載の映像信号の記録再生方法。

【請求項3】設定された受信チャンネルを受信して得られる映像信号をランダムアクセス可能な記録媒体に記録すると共に、記録された直後の前記映像信号を読み出し、その読み出して得られる映像信号を出力する映像信号記録再生装置において、

前記受信チャンネルが変更操作されたときに受信チャンネル変更信号を生成する受信チャンネル設定手段と、その受信チャンネル設定手段により生成された受信チャンネル変更信号が供給されたときは、受信チャンネルの変更操作前に前記記録媒体に記録された受信チャンネル映像信号を前記記録媒体から読み出して供給する、及び／又は受信チャンネルが変更中であることを示す画像信号を生成して供給する信号供給手段と、を少なくとも具備して構成することを特徴とする映像信号記録再生装置。

【請求項4】前記信号供給手段は、前記受信チャンネル変更前の受信チャンネル映像信号を動画信号として再生した後に、その受信チャンネル映像信号の一部をポーズ画像信号として供給するように構成することを特徴とする請求項3記載の映像信号記録再生装置。

【請求項5】前記信号供給手段は、受信チャンネルの設定が複数回続けてなされるとき、その設定終了から所定時間経過するまで、少なくとも前記記録媒体の再生手段より再生された前記受信チャンネル変更前の受信チャンネル映像信号、又はその映像信号の一部を供給するように構成することを特徴とする請求項3記載の映像信号記

録再生装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、受信チャンネルを設定してTV放送の映像、及び音声信号を得てハードディスクなどの記録媒体に記録すると共に、その記録した直後の映像信号を読み出すようになった同時記録再生機能を有する映像信号の記録再生方法、及び映像信号記録再生装置に関する。

【0002】

【従来の技術】記録媒体としてハードディスクなどのランダムアクセス可能な情報信号記録媒体を用いた映像信号記録再生装置は、記録、再生のためのアクセス時間が短いため、TV放送の複数の番組を同時に記録できる、また映像信号の記録と再生を同時に行うことが出来るなどの機能を有している。

【0003】そして、この様な同時記録再生機能を有する映像信号記録再生装置は、放送中の番組を現在から過去に連続的にタイムシフトしながら視聴できるキャッシュ再生、及び追っかけ再生などの便利な機能を有しており、今後、従来のタイムシフトマシンとして利用されているVTRと共に家庭に導入されていくものと考えられている。

【0004】その従来のVTRにおける記録信号のモニタは、VTRに内蔵されるTVチューナの信号を直接モニタTVに供給して視聴するようになされており、そのモニタ映像は記録途中にある信号のモニタはできるが、実際にどのようにビデオテープに記録されているか、そしてその記録映像の画質劣化、又は何らかの原因により記録がなされない状態であるかなどを知ることはできない。

【0005】それに対し、同時記録再生機能を有する記録再生装置では、記録中の映像をリアルタイムで再生しながら記録を行えるため、記録時の不具合に関してもその時に知ることができ、記録ミスを最低限におさえることができる。

【0006】さらに、記録中に再度見たい映像、または見逃した映像があるときは、簡易な操作で過去の映像を見ることができるなど、ハードディスクを用いて行う記録再生の機能は視聴者にとって便利な機能であり、そのような機能を搭載したPVR (personal video recorder) も開発されている。

【0007】

【発明が解決しようとする課題】ところで、そのハードディスクは高速にランダムアクセスができる記録媒体であるが、その媒体に記録される映像信号はMPEGなどの符号方式により圧縮符号化された信号が記録され、記録して再生される信号は復号して映像信号が得られるようになされるのが一般的である。

【0008】そのような、圧縮符号化、及び復号処理を

行うための処理速度は半導体技術の進歩により高速化されてはいるものの、現時点で数秒程度の処理時間をしており、その処理時間は同時記録再生によってモニタ信号を得る場合であってもその時間以上の信号遅延が生じてしまう課題があった。

【0009】そこで本発明は、そのような便利な機能を有する映像信号記録再生装置において、モニタ用の映像信号出力が所定時間遅延することにより装置の操作性能が劣化することが考えられるが、その遅延時間によっても操作性に遅れがなく、現在記録中である映像信号をリアルタイムでモニタできる、過去に記録した映像に向かって連続的に再生ができる、又現在視聴中の映像を一時停止し、かつ映像を乱すことなく（シームレスに）再生を再開できるなどの便利な機能を搭載した映像信号の記録再生方法の提供、及びそれらの機能を備えた映像信号記録再生装置の構成を提供しようとするものである。

#### 【0010】

【課題を解決するための手段】本発明の映像信号記録装置、映像信号再生装置、及び映像信号記録再生装置は、上記課題を解決するために以下の1)～5)の手段により成るものである。すなわち、

【0011】1) 設定された受信チャンネルを受信して得られる映像信号をランダムアクセス可能な記録媒体に記録すると共に、記録された直後の前記映像信号を再生する映像信号の記録再生方法において、前記受信チャンネルが変更操作されたときに受信チャンネル変更信号を生成する第1のステップ（95、79）と、その第1のステップにより生成された受信チャンネル変更信号が得られたときは、受信チャンネルの変更操作前に前記記録媒体に記録された受信チャンネル映像信号、及び／又は受信チャンネルを変更中であることを示す情報に係る変更中映像信号を出力信号として供給する第2のステップ（72、73）と、その第2のステップにおける変更中映像信号に続けて、受信チャンネルの変更操作後の前記記録媒体に記録、及び再生して得られる受信チャンネル映像信号を出力信号として供給する第3のステップ（72）と、を少なくとも有することを特徴とする映像信号の記録再生方法。

【0012】2) 前記第2のステップは、受信チャンネル変更操作前の受信チャンネル映像信号を所定時間動画信号として供給して後に、前記受信チャンネル映像信号より生成したポーズ画像信号を供給するようになすことを特徴とする1)項記載の映像信号の記録再生方法。

【0013】3) 設定された受信チャンネルを受信して得られる映像信号をランダムアクセス可能な記録媒体に記録すると共に、記録された直後の前記映像信号を読み出し、その読み出して得られる映像信号を出力する映像信号記録再生装置において、前記受信チャンネルが変更操作されたときに受信チャンネル変更信号を生成する受信チャンネル設定手段（95、79）と、その受信チ

ャンネル設定手段により生成された受信チャンネル変更信号が供給されたときは、受信チャンネルの変更操作前に前記記録媒体に記録された受信チャンネル映像信号を前記記録媒体から読み出して供給する、及び／又は受信チャンネルが変更中であることを示す画像信号を生成して供給する信号供給手段（65、63、61、71、72、73）と、を少なくとも具備して構成することを特徴とする映像信号記録再生装置。

【0014】4) 前記信号供給手段は、前記受信チャンネル変更前の受信チャンネル映像信号を動画信号として再生した後に、その受信チャンネル映像信号の一部をポーズ画像信号として供給するように構成することを特徴とする3)項記載の映像信号記録再生装置。

【0015】5) 前記信号供給手段は、受信チャンネルの設定が複数回続けてなされるとき、その設定終了から所定時間経過するまで、少なくとも前記記録媒体の再生手段より再生された前記受信チャンネル変更前の受信チャンネル映像信号、又はその映像信号の一部を供給するように構成することを特徴とする3)項記載の映像信号記録再生装置。

#### 【0016】

【発明の実施の形態】以下、本発明の映像信号の記録再生方法、及び映像信号記録再生装置の実施の形態につき、好ましい実施例により説明する。図1に、ハードディスクに映像信号を記録し、再生する映像信号記録再生装置の概略ブロック図を示し、その構成と動作について概説する。

【0017】同図において、この映像信号記録再生装置40は記録部50、媒体部60、及び再生部70によりなり、再生部70にはモニタTV90が有線により、リモコン95が赤外線により接続されている。

【0018】そして、記録部50はTVチューナ51、A/D変換器52、MPEG-2エンコーダ53、ストリームアナライザ54、REC-FIFO55、ヘッダ検出器56、マイコン57、及び一時記憶メモリ58により構成される。

【0019】また、媒体部60はハードディスク記録再生器61、ハードディスク63、及び書き込み読み出し制御器65より、そして再生部70はバッファメモリ71、MPEG-2デコーダ72、OSD73、D/A変換器74、マイコン76、一時記憶メモリ78、及びリモコンインターフェース79より構成される。

【0020】次に、この様に構成される映像信号記録再生装置40の動作について概説する。まず、受信するTVチャンネルがリモコン95が操作されてリモコン95より変調された赤外線信号が発光され、その赤外線信号はリモコンインターフェース79により受信され、受信されて得られた受信チャンネル情報はTVチューナ51に供給される。

【0021】そのTVチューナ51は、アンテナより入

来る放送電波の内、供給された受信チャンネル情報に基づく受信チャンネルの信号を受信し、受信して得られるビデオ信号はA/D変換器52に供給されてデジタル信号に変換されてMPEG-2エンコーダ53に供給される。

【0022】そのMPEG-2エンコーダ53では、供給された信号はISO/IEC (International Organization for Standardization / International Electrotechnical Commission) で定められたMPEG-2 (moving picture experts group- 2) 標準規格に従って圧縮符号化され、その圧縮符号化された信号はストリームアナライザ54、及び後述のヘッダ検出器56に供給される。

【0023】そのストリームアナライザ54では、圧縮符号化された信号の形式が解析され、解析して得られる符号化情報信号、及び供給された圧縮符号化信号はREC-FIFO55に供給される。

【0024】REC-FIFO55は記録(recording)用信号のFIFO(first in first out)動作、即ち入力される信号を一時記憶し、供給された順にその信号を出力する回路で、この回路より供給された信号はハードディスク記録再生器61に供給される。

【0025】そのハードディスク記録再生器61では、供給された信号をハードディスク63に記録するためのセクタサイズごとに分割された信号とされ、その分割された信号は書き込み読み出し制御器65に動作制御されるハードディスク63に供給され、供給された信号はハードディスク63の図示しない円盤状記録媒体に記録される。

【0026】そして、前述のヘッダ検出器56は、MPEG-2で符号化された信号より、例えばGOP (Group of Picture) のデータ構成に関わる符号化情報として供給され、その供給された符号化情報はマイコン57に供給される。

【0027】そのマイコン57では、供給された符号化情報を基にハードディスク63における情報の記録、及び再生をスムーズに行うためのハードディスク管理情報として生成され、その生成された管理情報は一時記憶メモリ58に一時記憶され、一時記憶されたハードディスク管理情報は適宜ハードディスク記録再生器61を介してハードディスク63に記録される。

【0028】このようにして、チャンネル選択がなされて受信されたビデオ信号、及び上述のハードディスク管理情報はハードディスク63に記録されるが、その供給されて記録されるビデオ信号が、例えばVTRなどの他の記録メディアに記録された信号であるときで、その信号がアナログ信号の場合は、そのビデオ信号はA/D変換器52に供給されて、同様の処理がなされてハードディスク63に記録される。

【0029】また、記録されるビデオ信号が、例えばB

Sデジタル放送、デジタル地上放送など、予めMPEG-2などの方式により符号化された信号であるときは、その符号化された信号はMPEG-2エンコーダを介さずに直接ストリームアナライザ54、及びヘッダ検出器56に供給され、同様の信号処理がされてハードディスク63に記録される。

【0030】なお、MPEG-2エンコーダ53がGOPの構成等に間する符号化情報を供給できる機能を有しているとき、あるいはデジタル放送などでGOPなどの符号化情報が補助情報として供給されるときは、その情報をヘッダ検出器56に供給し、ヘッダ検出器56はその情報を基に符号化情報を生成してマイコン57に供給するようにしてもよい。

【0031】この様にしてアナログTV放送、デジタルビデオ放送、又は他の記録媒体に記録された映像信号は圧縮符号化されたビデオ信号とされ、そのビデオ信号は管理情報と共にハードディスク63に記録される。

【0032】次に、この様にして記録部60のハードディスク63に記録された信号の再生について述べる。まず、リモコン95により再生ボタンが操作されたときは、その操作内容は変調された赤外光線によりリモコンインターフェース79に伝送され、リモコンキーの操作内容はマイコン76に供給される。

【0033】そのマイコン76からは、操作内容に応じて生成された制御信号が書き込み読み出し制御回路65に供給され、書き込み読み出し制御器65によりハードディスク63は制御され、ハードディスク63は指定された個所の信号を読み出し、読み出された信号はハードディスク記録再生器61に供給される。

【0034】ハードディスク記録再生器61ではハードディスク63より読み出された信号の増幅、特性の補正などが行われ、特性などの補正された信号はバッファメモリ71に供給される。

【0035】そこでは、圧縮符号化された信号は一時記憶され、MPEG-2デコーダからの要求に応じて一時記憶された信号は読み出されてMPEG-2デコーダ72に供給される。

【0036】MPEG-2デコーダ72では、供給された信号はMPEG-2標準に従い、エンコーダ53で圧縮符号化されたのと相補的な方法によりデコードされ、デコードされて得られたデジタルビデオ信号は必要に応じてOSD(On Screen Display)73により表示機に表示される表示信号が多重され、表示信号の多重されたデジタル映像信号はD/A変換器74に供給されてアナログビデオ信号に変換され、変換されたビデオ信号はモニタTV90に供給されて、表示される。

【0037】なお、ここでOSD73に多重される表示信号は、OSD73に内蔵される図示しないビデオRAMに蓄えられている信号、ないしは一時記憶メモリ78に記憶される表示内容情報がマイコン76を介してOS

D73に供給され、そのOSD73が供給された情報を基に生成した表示信号をMPEG-2デコーダ72から供給される映像信号に多重して表示するようになされている。

【0038】このようにして、供給されるビデオ信号はMPEG-2方式により、フレーム内圧縮、及び動き補償技術が用いられてエンコードされてハードディスク63に記録され、ハードディスク63に記録された信号はMPEG-2デコーダによりデコードされるが、その様にしてなされるMPEG-2方式により扱われる画像信号について述べる。

【0039】図2に、MPEG-2方式により扱われる画像の種類について示す。同図において、ビデオ信号を構成するフレーム画像(ピクチャ)にI、B、Pの名前がつけられて時間方向に並べられているが、そのIはフレーム内符号化のなされるI(Intra-code)フレーム(ピクチャ)である。

【0040】そして、Pは図の下に矢印で示される様に1方向に予測符号化のされるP(Predictive-coded)フレームであり、またBは過去及び未来の両方向から動き予測ベクトルが求められて符号化されるB(Bidirectionally predictive-coded)フレームである。

【0041】このように、MPEG-2により符号化される画像は、3種類の性質を持つフレーム画像により構成されているが、例えばIフレームは15枚毎に配置されるが、Iフレームから、次のIフレームが開始される手前までの15枚のフレーム画像の集合をGOP(Group of Picture)と呼んでいる。

【0042】そのGOPが単位として画像が扱われる時は、このようにして符号化される画像の復号は、Iフレームを復号して後にP、及びBフレームの復号がなされるため、最初にIフレームの復号を行う必要がありGOPの先頭にIフレームが配置されるようになされている。

【0043】そして、そのIフレームの復号がなされていないときは、その後のPフレーム、及びBフレームの復号が出来なく、入来されるデータの復号は次のGOPのIフレームのデータを待って復号することとなる。

【0044】そのときのGOPの間隔は、N=15で構成されているときは15フレーム分、即ちNTSC(national television system committee color television system)のように毎秒30フレームであるビデオ信号の場合は0.5秒( $15/30=0.5$ )おきに符号化されているGOPの信号を得てデコードすることとなる。

【0045】従って、例えばハードディスク63に記録されるデータを読み出してすぐに復号するためにはGOPの最初のデータをアクセスして得る必要があり、そのためにGOPの最初の部分を示す管理情報を用い、復号

時間の短縮を行なうようとする。

【0046】さて、その管理情報を用いるなど、高速度でハードディスクに符号化された画像信号の記録、再生を行う映像信号記録、再生装置では、信号の記録及び再生の動作を同時に行うことも可能であり、ハードディスク上の離れた位置への記録及び再生を同時に行なうことができる。

【0047】その同時録再により実現できる機能として、現在記録中の番組を記録しながら過去に記録した部分を同時に再生するいわゆる後追い再生、及び所定の時間分のビットストリーム記録領域に順次映像音声情報を記録し、その領域の最後まで記録したときは、領域中の一番古い記録に対して新しい情報を上書きして記録するようにし、所定時間分の映像音声情報を過去にさかのぼって再生することができるキャッシング録再がある。

【0048】そのキャッシング録再は、記録した直後の映像を再生するようにして行い、通常は記録直後の再生映像をリアルタイム画像として視聴し、視聴者の操作によるリアルタイム映像から過去に記録した映像に連続的にタイムシフトしながら再生する機能である。

【0049】ここで、そのリアルタイム画像として再生される状態をライブ状態と呼ぶこととし、そのライブ状態と過去に記録した映像との間を連続的にスイープしながら行なうが、ライブ状態の映像から過去の映像への切り換えはスムーズに行われる必要がある。

【0050】即ち、仮にライブ状態の映像の代りに、MPEG-2のエンコード、デコード、及びハードディスクへの記録再生処理を行わない、装置への入力信号そのまま用いることも考えられるが、そのような場合は入力信号とライブ状態の信号の間にMPEG-2による符号化、復号、及びハードディスクへの記録再生における処理時間としての遅延時間差が生じることとなり、現在の映像(ライブ状態)から過去の映像にスムーズな移行を行なえない。

【0051】そのため、特にリアルタイム視聴状態から過去へ遡る再生を行うときの信号の切り換え時に時間的な不連続が生じ、一瞬映像が乱れる、あるいは絵柄がスキップするなどの様に表示され、現在から過去に対してスムーズな繋がりによる映像を表示することができない、又視聴中の映像の画像を乱すことなく一時停止させ、それを解除して再生させることができないなど、視聴者に不自然な感じを与えることとなる。

【0052】そこで、ハードディスクを用いる場合のキャッシング録再では、記録を継続しながら短時間前に記録した映像を再生するため、簡単な操作により現在の映像から過去の映像までを連続的に再生することができるようになされており、このような再生機能はライブ状態の映像を現在の映像として再生することにより実現されている。

【0053】次に、そのライブ状態の再生機能を実現す

るためのキャッシング録再について更に述べる。キャッシング録再のための記録は、予め指定された記録時間の映像信号を所定の領域に記録する記録モードで、指定された記録時間を超えて記録がなされるときは古い記録部分に新しい映像信号が記録されるようにして、常に最新の映像信号が所定の記録領域に記録されるようになされる。

【0054】例えば、キャッシング記録時間を1時間に設定してキャッシング録再を行う場合は、ライブ状態の映像信号から最大1時間過去に遡った映像信号までを直接的にタイムシフトしながら再生することができるものである。

【0055】図3に、そのキャッシング録再を行うときのビットストリームについて模式的に示し、説明する。同図はハードディスク63に記録される映像信号のビットストリームを示したもので、①はハードディスクより読み出したビットストリームを復号している時点であり、②は符号化されたビットストリームを記録している時点である。

【0056】そして、同図において①より左側に示される(1)は過去に遡って再生が可能なビットストリームの部分を示し、②より右側の(3)は過去にビットストリームを記録した領域を示し、この部分に順次新しいビットストリームを記録していく。

【0057】①と③の間にある領域(2)は、例えばVBV(video buffering verifier)バッファとして動作するバッファメモリ71に所定量のビットストリームが一時記憶されてなく、MPEG-2デコーダにビットストリームを供給できない、あるいは、デコーダが安定して映像、音声をデコードするのに必要なビットストリームの量が供給されてない等の理由により、安定した復号動作を行うために必要なビットストリーム量のデータが存在しない領域である。

【0058】このようにして、ハードディスク63に記録される信号は、(2)で示される所定時間経過後のビットストリーム領域(1)の期間でないと再生ができなく、その領域(1)の最も早い時間①を再生している状態が前述のライブ状態である。

【0059】そのライブ状態において、視聴者は放送されている映像信号をそのまま遅延時間なしに視聴していると認識するのが通例であるが、実際にはエンコーダ53による符号化時間、所定量のビットストリームの記録時間、及びデコーダ72による復号時間の期間遅延された映像信号を視聴していることとなる。

【0060】そして視聴者が、その視聴している放送のチャンネル切り換え操作を行うこともあるが、この映像信号記録再生装置40は、チャンネル切り換えはライブ状態で視聴している場合に限って動作するように制限している。

【0061】即ち、再生状態がライブ状態から標準再生速度よりも遅いスロー再生状態、又はポーズ状態、ある

いは逆方向再生状態とされるときは、過去の映像を再生することになるため、ライブ状態ではなくなり、そのライブ状態でないときは受信チャンネルの切り換えが禁止されるようになされている。

【0062】このようにして、この記録再生装置ではライブ状態のときにのみ受信チャンネルの変更が可能とされるが、その場合においても放送時間と表示時間の間に前述の遅延時間が生じており、その遅延時間を認識していない視聴者には、遅延して変更される受信チャンネルの映像が表示されることに対し違和感を与えることとなる。

【0063】それは視聴者にとって、ライブ状態におけるチャンネル変更も、従来のTV視聴の様にチャンネル変更操作後直ちに受信チャンネルの変更がなされるのが望ましいが、ライブ状態にある記録再生装置の受信チャンネル変更映像の表示は所定の時間符号化し、記録し、再生し、そしてデコードした映像でないと表示できないからである。

【0064】このようにして、ライブ状態における受信チャンネルの変更には所定の時間が必要とされるが、そのときに表示される映像は、変更前の映像が表示された後チャンネル変更時の乱れた映像が表示され、その後正常な変更後の受信チャンネル映像が表示される。

【0065】その、チャンネル変更時の映像信号の乱れは、例えば放送局間の映像信号の同期時間関係が一致してなく、チャンネルが変更され、エンコーダ等の同期が新しい受信チャンネルの信号に合うまでの間、正規の符号化、及び復号がなされなく、その正規でない信号は乱れた信号とされて表示されるなどである。

【0066】このチャンネル切り換え時における信号の乱れは、受信される信号がアナログ放送の場合であるが、MPEG-2方式で符号化されて放送されるデジタル放送受信の場合は、前述のIフレームの信号が復号されるまでは正規の画像を得ることはできなく、通常は0.5秒程度の乱れた映像が復号されて後に正常な映像が復号されている。

【0067】次に、このようにして生じるチャンネル切り換え時の信号の乱れについて更に述べる。図4はチャンネル変更時に表示される映像の状態を時間軸上で模式的に示したものである。

【0068】同図において、領域(11)は受信チャンネルAが受信されている、(12)はチャンネル変更との乱れた映像が記録されている、そして(13)は変更されたチャンネルの映像信号が正常に記録されている区間である。

【0069】即ち、④はハードディスクより読み出された信号がバッファメモリ71に一次蓄積された後にMPEG-2デコーダで復号される時点であり、その手前の④はビットストリームを記録している現在時点であり、そして⑤は変更されたチャンネルの正常な映像が再生可

能とされる時点である。

【0070】このような期間に生じる乱れた映像は、その間ミュートすることによりその乱れた映像を表示しない様にすることはできるが、そのミュート画像が例えば単一色のミュート画像であるときなどはエンタテインメント用画像としては好ましくなく、更に好ましい画像の表示が必要であり、次に述べる。

【0071】図5に、チャンネル変更時の表示方法に関して例示し、説明する。同図において、③はチャンネル変更操作時点であり、チャンネル変更操作の行えるライブ状態の場合は前述の図4に示した現在復号している時点③と同一時刻である。

【0072】そして、領域(21)の、領域(22)の手前にポーズ開始点⑦が、また領域(23)の開始後にデコード開始点⑨が設定され、⑦と⑨の間がチャンネルAのポーズ画像再生の区間とされている。

【0073】次に、このようにして行うチャンネル変更時の表示例について述べる。まず、時刻③においてリモコン95等が操作され、受信チャンネルがAからBとされたとき、即ちそのときは領域(11)にチャンネルAの映像を書き終えたときであり、そのときにリモコン95になされた操作を検出したリモコンインターフェース79はTVチューナ51に対してその操作情報を供給すると共に、その操作情報はOSD73に供給される。

【0074】その操作情報が供給されたOSD73は、チャンネル変更の操作が受けつけられ、チャンネルBの受信準備中である旨のメッセージをMPEG-2デコーダ72より供給される映像信号に多重し、モニタTV90にOSD73の多重情報が表示されるようにする。

【0075】視聴者に対してチャンネルAの映像は領域(11)の期間継続して提示されるため、視聴者はこの領域(11)の表示が継続され、受信チャンネルが更新されない期間であってもOSDの多重情報によりチャンネルB受信の準備状態であることが認識できる。

【0076】次に、領域(11)の再生が終了する手前の時刻⑦において、MPEG-2デコーダ72は、チャンネルAの動画再生状態をポーズ画面再生状態とされ、⑦の時刻よりチャンネル変更中の途中映像領域(12)が終了し、正常な映像が得られる時点⑨までの期間チャンネルAのポーズ画面を、受信チャンネル映像信号の一部をポーズ画像信号とすることにより供給する。

【0077】そして、時刻⑨以降には、MPEG-2デコーダはチャンネルBの正常な映像を復号し、その映像が表示機に供給されるようになされると共に、OSD73による多重情報も解除されてチャンネル変更の処理が終了する。

【0078】このようにして、ポーズ画面がチャンネル変更期間表示されるため、例えばチャンネル変更時に生じるTVチューナ51の局部発振器周波数切り換え期間、異なる同期信号で受信されるTV信号の同期信号処

理期間、及びその他の原因により生じるチャンネル変更時の乱れた映像を表示することなく、きれいな映像によりチャンネルAかBへの変更処理がなされるものである。

【0079】そして、前述の図1に示すような映像信号記録再生装置40の例では、キャッシング録再時のライブ状態では約3秒の遅延時間が生じて表示されているが、この3秒間は視聴者にとって長く感じられる時間である。

【0080】そこで、上述の実施例では、チャンネル変更操作後も⑨から⑦までの間チャンネルAの映像を動画のまま表示し、ポーズ画像の表示時間を短縮することにより、視聴者が感じる待ち時間の間隔を短縮している。

【0081】このようにして、リモコン95が操作され、正常でない画像を表示することなく、受信チャンネルをAからBに切り換え処理を行なうことができる。次に、そのチャンネル切り換えの操作が複数回数のボタン操作により行われる場合の動作について述べる。

【0082】そのチャンネル切り換えが複数回のボタン操作により行われるのは、例えば複数桁のチャンネル指定を複数個のボタン操作により行う場合、そしてチャンネル切り換えボタンがアップ、ダウン操作によりなされる場合などである。そのアップダウン操作による場合は、チャンネル選択を+1、又は-1することにより、ボタンを複数回操作して目的とする受信チャンネルを選択操作するものである。

【0083】チャンネル切り換えがこのような操作によりなされるときは、チャンネルが変更するたびに前述のように映像信号に乱れが生じる。そこで、このように、チャンネル切り換えボタンが連続して多数回操作されるような場合はその間をポーズ状態の映像を表示する期間とし、連続チャンネル変更操作が終了した時点で、最終的に選択されている受信チャンネル信号に対するキャッシング録再映像を表示するようにする。

【0084】そして、キャッシング再生が可能な領域、即ち連続してタイムシフトしながら表示できる過去の映像区間を領域(13)とし、その区間の開始点をチャンネルAのキャッシング再生可能位置⑩から、例えば⑨の位置に指定を更新する。

【0085】このようにして受信チャンネルを操作しながらキャッシング録再を行なうことができる装置を構成することが出来る。なお、そのときの受信チャンネル数は1を例として述べたが、アクセス速度の速いハードディスクを用いて、複数チャンネルの信号を受信しながら、それらの受信信号を記録する装置を構成することも出来る。

【0086】その場合は、複数の記録部50を有し、又は周波数分割動作などにより複数の受信信号を受信するなどにより複数のビットストリームをハードディスク63に記録する機能を実現するが、そのようなときのチャ

ンネル設定も同様な方法、構成によればよい。

【0087】以上、放送される信号を受信して、キャッシュ録再を行う映像信号の記録再生方法、及び映像信号記録再生装置の構成とその動作について述べたが、その映像信号記録装置40を、記録部50と媒体部60より構成される映像信号記録装置として、また再生部70を映像信号再生装置として構成する方法がある。

【0088】それらの映像信号記録装置と映像信号再生装置は異なる場所に設置し、それらの離れた場所に設置される装置はホームネットワークなどにより結合して動作させる場合である。

【0089】そのときの映像信号記録装置はホームサーバーとされて家庭内に設置され、そのホームサーバーに映像信号再生装置がホームネットワークで接続され、その映像信号再生装置がモニタテレビの設置される部屋ごとに、複数のセットトップボックスとして設置されるものである。

【0090】この場合、そのホームサーバーはビットストリーム送出装置として、セットトップボックスはビットストリーム受信端末として構成され、両者は高速無線LAN、あるいはホームLANなどにより結合され、双方向通信を行いながらハードディスクに記録される映像信号情報が各部屋からの操作命令により、目的とするビットストリームが使用者の操作するセットトップボックスを介して、視聴するモニタTVに供給され、復号されたビデオ信号が表示されるようにされる。

【0091】このように、離れた場所に送信端末と受信端末としての記録装置と再生部を設置し、通信手段で結合して動作させる場合は、複数の送信端末と、複数の受信端末がネットワークで結合されて動作させるネットワーク形映像システムを構成することになる。

【0092】さらに、媒体部に用いられる記録媒体はハードディスクを中心として述べたが、記録媒体は高速アクセスが可能な媒体、例えば光磁気ディスク、RAM形、又はRW形のDVD、そして半導体メモリ形記録媒体等の他の記録媒体を用いた装置にも適用できる。

【0093】また、映像信号の符号化方式をMPEG-2方式を例として述べたが、圧縮符号化の方法はこれに限らず、俗にモーションJPEGと呼ばれるフレーム内符号化による方法、あるいはMPEG-4方式、MPEG-7方式、これから規格化の開始されるMPEG-2.1方式、その他フラクタルの圧縮手法を用いるものなどであってもよい。

【0094】

【発明の効果】請求項1記載の発明によれば、キャッシュ録再機能により映像信号の記録、再生を行っているときに受信チャンネルの変更操作がなされた場合は、受信中である映像信号の再生を継続すると共に、表示画面に受信チャンネルを変更処理中である旨の情報を表示し、変更された受信チャンネルのキャッシュ録再機能による

再生が可能とされる時点で新しい受信チャンネルの映像を表示するようにしたため、チャンネル切り換え操作に対して所定時間遅延して新しいチャンネルの映像が表示されるキャッシュ録再機能による再生映像を表示している場合であっても、ボタンを操作している視聴者にチャンネル変更命令が受け付けられてチャンネル変更処理中であることを報知することができるため、スムーズな動作によりライブ映像から過去に記録した映像迄のタイムシフト操作を行いながら連続的に視聴できるキャッシュ録再の機能を有する映像信号の記録再生方法を提供することができる効果がある。

【0095】また、請求項2記載の発明によれば、請求項1記載の効果に加え、受信チャンネルの変更操作がなされ受信チャンネルの変更処理がなされる期間、キャッシュ録再機能により再生可能なチャンネル変更前の映像信号、又はそのポーズ画像信号を表示するようにしているため、チャンネル切り換え時に生じる乱れた映像信号を再生することなく正常な画像により変更されたチャンネルの映像信号を表示できるなど、スムーズな動作によりライブ映像から過去に記録した映像迄をタイムシフト操作により連続的に視聴できるキャッシュ録再機能を有する映像信号の記録再生方法を提供することができる効果がある。

【0096】そして、請求項3記載の発明によれば、キャッシュ録再機能により映像信号の記録、再生を行っている映像信号記録再生装置で、受信チャンネルの変更操作がなされたときは、受信中である映像信号の再生を継続すると共に、表示画面に受信チャンネルを変更処理中である旨の情報を表示し、変更された受信チャンネルのキャッシュ録再機能による再生が可能とされる時点で新しい受信チャンネルの映像を表示するようにしたため、チャンネル切り換え操作に対して所定時間遅延した映像が表示されるキャッシュ録再機能による映像を表示している場合であっても、ボタンを操作を行った視聴者にチャンネル変更命令が受け付けられてチャンネル変更処理中であることを報知することができるため、スムーズな動作によりライブ映像から過去に記録した映像迄をタイムシフト操作により連続的に視聴することができるキャッシュ録再機能を有する映像信号の記録再生装置の構成を提供することができる効果がある。

【0097】また、請求項4記載の発明によれば、請求項3記載の効果に加え、受信チャンネルの変更操作がなされ受信チャンネルの変更処理がなされる期間、キャッシュ録再機能により再生可能な変更前チャンネルの映像信号、又はそのポーズ画像信号を表示するようにしたため、チャンネル切り換え時に生じる乱れた映像信号を再生することなく正常な画像により変更されたチャンネルの映像信号を表示できるなど、スムーズな動作によりライブ映像から過去に記録した映像迄をタイムシフト操作により連続的に視聴できるキャッシュ録再機能を有する

映像信号の記録再生装置の構成を提供することができる効果がある。

【0098】さらに、請求項5記載の発明によれば、請求項3記載の効果に加え、受信チャンネルの変更操作が連続してなされ受信チャンネルの変更処理が確定されるまでの期間、キャッシング再機能により再生可能な変更前チャンネルの映像信号、又はそのポーズ画像信号を表示するようにしたため、チャンネル切り換え時に生じる乱れた映像信号を再生することなく正常な画像により変更されて確定したチャンネルの映像信号を表示できるなど、スムーズな動作によりライブ映像から過去に記録した映像迄をタイムシフト操作により連続的に視聴できるキャッシング再機能を有する映像信号の記録再生装置の構成を提供することができる効果がある。

【図面の簡単な説明】

【図1】本発明の実施例に係る映像信号記録再生装置の概略ブロック図である。

【図2】MPEG-2方式により動き補償がなされて符号化されるフレーム信号の構造を示した図である。

【図3】本発明の実施例に係るキャッシング再中のビットストリームを模式的に示した図である。

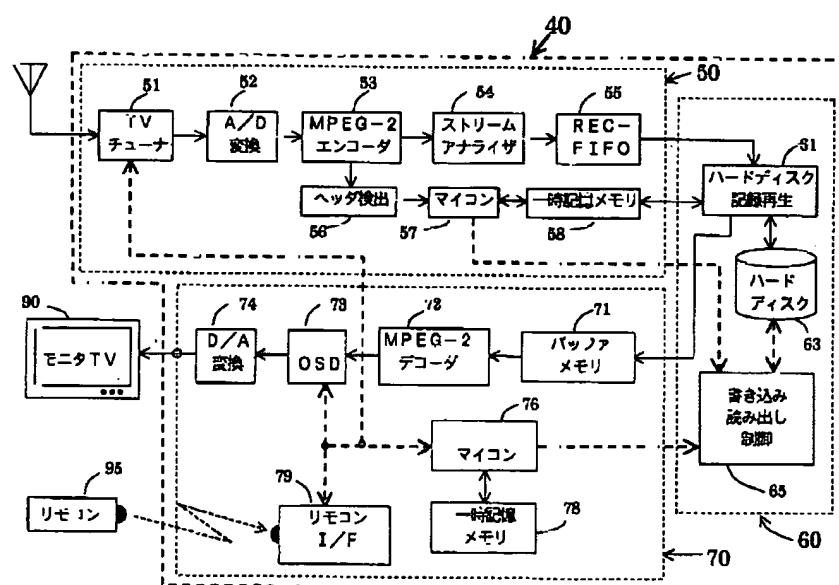
【図4】本発明の実施例に係るチャンネル変更時に表示される映像の状態を時間軸上で模式的に示した図である。

【図5】本発明の実施例に係るチャンネル変更時に表示の表示方法に関して例示した図である。

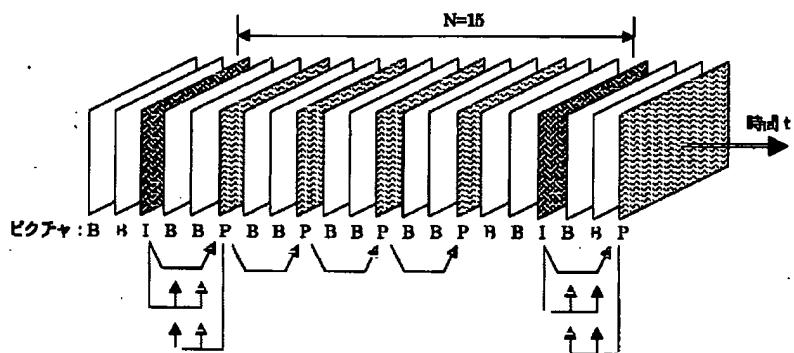
【符号の説明】

- 40 映像信号記録再生装置
- 50 記録部
- 51 TVチューナ
- 52 A/D変換
- 53 MPEG-2エンコーダ
- 54 ストリームアナライザ
- 55 REC-FIFO
- 56 ヘッダ検出器
- 57 マイコン
- 58 一時記憶メモリ
- 60 媒体部
- 61 ハードディスク記録再生器
- 63 ハードディスク
- 65 書き込み読み出し制御器
- 70 再生部
- 71 バッファメモリ
- 72 MPEG-2デコーダ
- 73 OSD
- 74 D/A変換
- 76 マイコン
- 78 一時記憶メモリ
- 79 リモコンインターフェース
- 90 モニタTV
- 95 リモコン

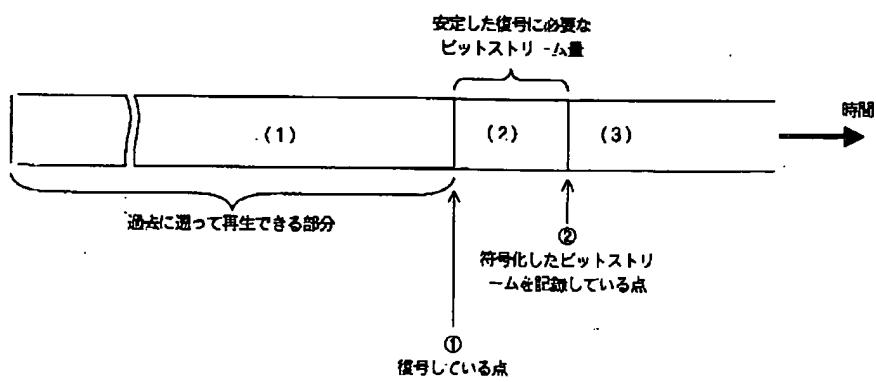
【図1】



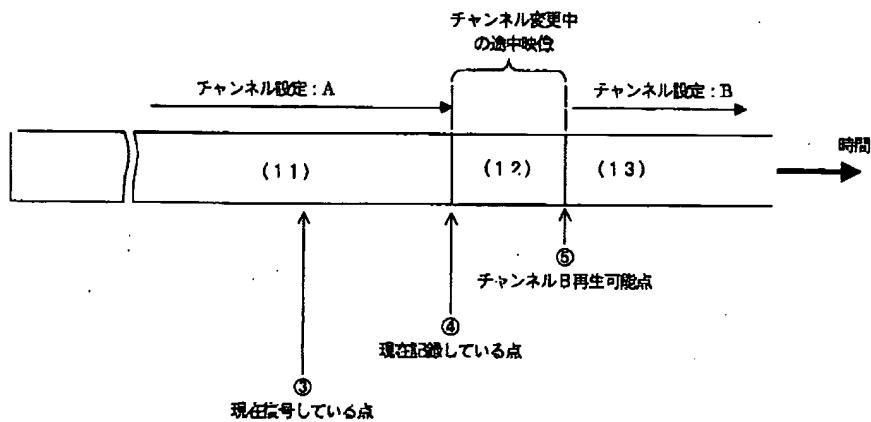
【図2】



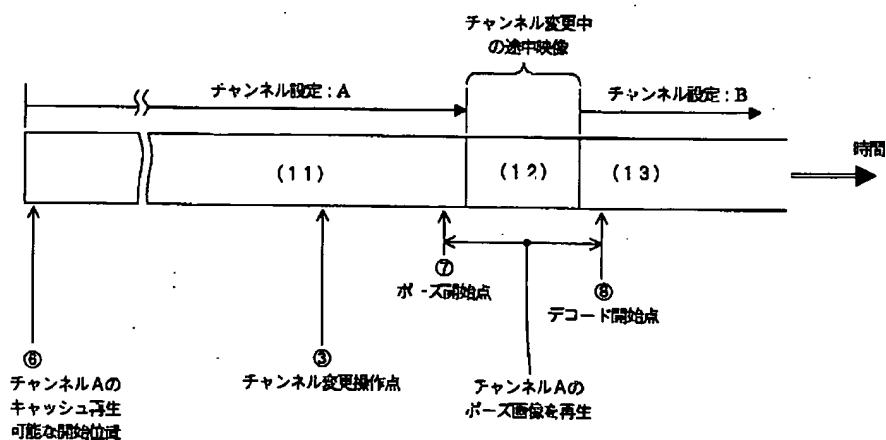
【図3】



【図4】



【図5】



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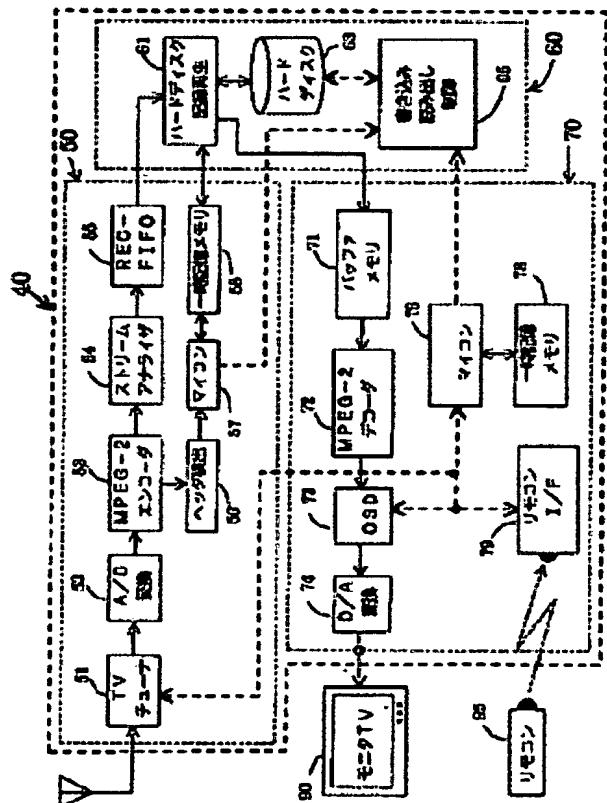
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**Abstract:**

PROBLEM TO BE SOLVED: To realize a recording and reproducing device for allowing a viewer to

perform a channel switching operation with spontaneous sensation at the time of recording an encoded video signal in a recording medium such as a hard disk, reproducing the previously recorded signal, and allowing the view the video signal as a delayed video. **SOLUTION:** This video signal recording device is provided with a function for encoding a supplied video signal by an encoder 53, for recording it in a recording medium 63, and for reproducing the signals ranging from the signal which is about to be recorded to the signal recorded in the past by smooth time sweep. The change of a receiving channel in this video signal recording device is realized by successively displaying the video signals of the channel prior to change when the channel changing operation is performed, and multiplexing and transmitting information indicating that the channel change professing is being executed to a viewer by an on-screen display 73, and displaying the video signal at a display after the normal video signal is obtained by a decoder 72.



## JPO Machine translation abstract:

## (57) **Abstract**

**SUBJECT** The video signal coded to recording media, such as a hard disk, is recorded, and it faces playing, and viewing and listening to the signal immediately after record with the delayed image, and is in realizing the recording and reproducing device with which a televiewer can perform channel switching operation with natural feeling.

**Means for Solution** Code a video signal supplied with the coding equipment 53, and it records on the recording medium 63, Change of a receiving channel in a video signal recorder with a function which reproduces even a signal recorded on the past from a signal of the record latest by a smooth time sweep, When change operating is made, continue and display a video signal of a channel before change, and. Multiplex **of the information which shows that it is / channel change / under processing** was carried out on the onscreen display 73, and it transmitted to a televiwer, and after a normal video signal was obtained by the decoder 72, as the video signal was displayed on a display machine, it realized.

### **Claim(s)**

**Claim 1** Record a video signal produced by receiving a set-up receiving channel on a recording medium in which random access is possible, and, In recording and reproducing systems of a video signal which reproduces said video signal immediately after recording, The 1st step that

generates a receiving channel change signal when change operating of said receiving channel is carried out, When a receiving channel change signal generated by the 1st step is acquired, The 2nd step that supplies a video signal as an output signal during change concerning a receiving channel video signal recorded on said recording medium before change operating of a receiving channel, and/or information which shows that a receiving channel is under change, Recording and reproducing systems of a video signal continuing to a video signal during change in the 2nd step, and having at least the 3rd step that supplies a receiving channel video signal recorded, and reproduced and obtained by said recording medium after change operating of a receiving channel as an output signal.

**Claim 2** Recording and reproducing systems of the video signal according to claim 1 making said 2nd step as **supply / supply a receiving channel video signal before receiving channel change operating as a predetermined time moving image signal, and / a pose image signal behind generated from said receiving channel video signal**.

**Claim 3** Record a video signal produced by receiving a set-up receiving channel on a recording medium in which random access is possible, and. In a video-signal recording and reproducing device which reads said video signal immediately after recording, and outputs the video signal produced by reading, A receiving channel setting-out means to generate a receiving channel change signal when change operating of said receiving channel is carried out, When a receiving channel change signal generated by the receiving channel setting-out means is supplied, A signal supply means which generates and supplies a picture signal which shows that read a receiving channel video signal recorded on said recording medium before change operating of a receiving channel from said recording medium, and supply it, and/or a receiving channel is changing it, A video-signal recording and reproducing device which possesses and is characterized by constituting even if small.

**Claim 4** The video-signal recording and reproducing device according to claim 3 constituting it so that a part of the receiving channel video signal may be supplied as a pose image signal after said signal supply means reproduces a receiving channel video signal before said receiving channel change as a moving image signal.

**Claim 5** When setting out of a receiving channel is made continuously two or more times, until it carries out specified time elapse of said signal supply means from the end of setting out, A receiving channel video signal before said receiving channel change reproduced from a reproduction means of said recording medium at least, or the video-signal recording and reproducing device according to claim 3 constituting so that a part of the video signal may be supplied.

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## Detailed Description of the Invention

### 0001

**Field of the Invention** This invention sets up a receiving channel, acquires the image of TV broadcast, and an audio signal, and records them on recording media, such as a hard disk, and it relates to the recording and reproducing systems and the video-signal recording and reproducing device of the video signal which has the simultaneous record reproduction function made as **read / the video signal immediately after / that / recording**.

### 0002

**Description of the Prior Art** The video-signal recording and reproducing device using the information signal recording medium in which random access, such as a hard disk, is possible as a recording medium, Since the access time for record and reproduction is short, it has a function of two or more programs of TV broadcast being recorded simultaneously, and being able to perform record and reproduction of a video signal simultaneously.

**0003** And the video-signal recording and reproducing device which has such a simultaneous record reproduction function has convenient functions, such as cache reproduction to which it can view and listen while carrying out time shifting of the program under broadcast to the past continuously from the present, and groupie reproduction.

It is thought that it will be introduced into a home from now on with VTR used as a conventional time shifting machine.

**0004** The monitor of the record signal in the conventional VTR is made as **listen / supply directly the signal of TV tuner built in VTR to monitor TV, and / to it / view and**.

Although the monitor of the signal which the monitor picture has in the middle of record can be

performed, it cannot be known whether it is in how it is actually recorded on videotape, the image quality deterioration of the recorded video image, and the state where record is not made by a certain cause.

**0005**In the recording and reproducing device which has a simultaneous record reproduction function to it, since it is recordable, reproducing the image under record in real time, it can know then also about the fault at the time of record, and a recording mistake can be pressed down to minimum.

**0006**When an image to see again or the overlooked image is during record, the function of the record reproduction performed using a hard disk -- the past image can be seen -- by simple operation is a function convenient for a televiwer.

PVR (personal video recorder) which carries such a function is also developed.

**0007**

**Problem to be solved by the invention**By the way, although the hard disk is a recording medium which can do random access at high speed, As for the signal which the signal by which compression encoding was carried out with mark systems, such as MPEG, is recorded, records the video signal recorded on the medium, and is reproduced, being made as **obtain / decode and / a video signal** is common.

**0008**Although accelerated by progress of semiconductor technology, the processing speed for performing such compression encoding and decoding processing, The processing time for about several seconds was required at present, and even if the processing time was a case where a monitor signal was acquired by simultaneous record reproduction, it had SUBJECT which the signal delay more than the time produces.

**0009**Then, although this invention can consider that operation performance of equipment deteriorates in a video-signal recording and reproducing device which has such a convenient function when video signal outputs for a monitor carry out a specified time lag, . Also by the time delay, there is no inferiority in operativity and a video signal which is under record now can be monitored in real time. Toward an image recorded in the past, can do reproduction continuously and an image under present viewing and listening is halted, And it is going to provide offer of recording and reproducing systems of a video signal which carries a convenient function of being able to resume reproduction, without disturbing an image (seamlessly), and composition of a video-signal recording and reproducing device provided with those functions.

**0010**

**Means for solving problem**A video signal recorder, video-signal playback equipment, and a video-signal recording and reproducing device of this invention comprise the following means of 1-5, in order to solve an aforementioned problem. namely**0011**) Record a video signal produced by receiving a set-up receiving channel on a recording medium in which random access is possible, and. In recording and reproducing systems of a video signal which reproduces said video signal immediately after recording, The 1st step (95, 79) that generates a receiving channel change signal when change operating of said receiving channel is carried out, When a receiving channel change signal generated by the 1st step is acquired, A receiving channel video signal recorded on said recording medium before change operating of a receiving channel, And/or, the 2nd step (72, 73) that supplies a video signal as an output signal during change concerning information which shows that a receiving channel is under change, Recording and reproducing systems of a video signal continuing to a video signal during change in the 2nd step, and having at least the 3rd step (72) that supplies a receiving channel video signal recorded, and reproduced and obtained by said recording medium after change operating of a receiving channel as an output signal.

**0012**) Recording and reproducing systems of a video signal given in 1 clause making said 2nd step as **supply / supply a receiving channel video signal before receiving channel change operating as a predetermined time moving image signal, and / a pose image signal behind generated from said receiving channel video signal** .

**0013**) Record a video signal produced by receiving a set-up receiving channel on a recording medium in which random access is possible, and. In a video-signal recording and reproducing device which reads said video signal immediately after recording, and outputs the video signal produced by reading, A receiving channel setting-out means (95, 79) to generate a receiving channel change signal when change operating of said receiving channel is carried out, When a receiving channel change signal generated by the receiving channel setting-out means is supplied, . Read a receiving channel video signal recorded on said recording medium before

change operating of a receiving channel from said recording medium, and supply it. And/or, a video-signal recording and reproducing device providing at least a signal supply means (65, 63, 61, 71, 72, 73) which generates and supplies a picture signal which shows that a receiving channel is changing, and constituting it.

**00144)** A video-signal recording and reproducing device given in 3 clauses constituting it so that a part of the receiving channel video signal may be supplied as a pose image signal after said signal supply means reproduces the receiving channel video signal before said receiving channel change as a moving image signal.

**00155)** When setting out of a receiving channel is made continuously two or more times, until it carries out specified time elapse of said signal supply means from the end of setting out, A receiving channel video signal before said receiving channel change reproduced from the reproduction means of said recording medium at least, or a video-signal recording and reproducing device given in 3 clauses constituting so that a part of the video signal may be supplied.

**0016**

**Mode for carrying out the invention** Hereafter, desirable working example explains about the recording and reproducing systems of the video signal of this invention, and the embodiment of a video-signal recording and reproducing device. A video signal is recorded on a hard disk, the schematic block diagram of the video-signal recording and reproducing device to play is shown in drawing 1, and the composition and operation are outlined.

**0017** In the figure, this video-signal recording and reproducing device 40 consists of the Records Department 50, the medium part 60, and the regenerating section 70, monitor TV90 is connected by cable and the remote control 95 is connected to the regenerating section 70 by infrared rays.

**0018** And the Records Department 50 comprises the TV tuner 51, A/D converter 52, the MPEG-2 encoder 53, the stream analyzer 54, REC-FIFO55, the header detector 56, the microcomputer 57, and the temporary storage memory 58.

**0019** The medium part 60 from the hard disk record reproducer 61, the hard disk 63, and the write-in reading control machine 65. And the regenerating section 70 comprises the buffer memory 71, the MPEG-2 decoder 72, OSD73, D/A converter 74, the microcomputer 76, the temporary storage memory 78, and the remote control interface 79.

**0020** Next, operation of the video-signal recording and reproducing device 40 constituted by this appearance is outlined. First, an infrared signal with which the remote control 95 was operated and TV channel to receive was modulated from the remote control 95 emits light, and receiving channel information which the infrared signal was received by the remote control interface 79, and was acquired by being received is supplied to the TV tuner 51.

**0021** A video signal which the TV tuner 51 receives a signal of a receiving channel based on receiving channel information supplied among broadcasting electric-waves which carry out ingress from an antenna, and is acquired by receiving is supplied to A/D converter 52, is changed into a digital signal and supplied to the MPEG-2 encoder 53.

**0022** In the MPEG-2 encoder 53. A supplied signal ISO/IEC. (International Organization.) for Standardization. Compression encoding is carried out according to MPEG-2 (moving picture experts group- 2) standards defined by /International ElectrotechnicalCommission, A signal with which the compression encoding was carried out is supplied to the stream analyzer 54 and the below-mentioned header detector 56.

**0023** In the stream analyzer 54, an encoded information signal acquired by analyzing form of a signal by which compression encoding was carried out, and analyzing, and a supplied compression coded signal are supplied to REC-FIFO55.

**0024** It is a circuit which REC-FIFO55 stores temporarily a signal into which it FIFO(first in first out )-operates, namely, a signal for record (recording) is inputted, and outputs the signal to supplied order, A signal supplied from this circuit is supplied to the hard disk record reproducer 61.

**0025** It is considered as a signal divided for every sector size for recording a supplied signal on the hard disk 63 in the hard disk record reproducer 61, The divided signal is supplied to the hard disk 63 by which motion control is carried out to the write-in read-out controller 65, and a supplied signal is recorded on a disc-like recording medium which the hard disk 63 does not illustrate.

**0026** And the above-mentioned header detector 56 is supplied from the signal coded by MPEG-2, for example as encoded information in connection with the data configuration of GOP (Group of Picture), and the supplied encoded information is supplied to the microcomputer 57.

**0027** Record of information in / based on the encoded information supplied in the microcomputer 57 / the hard disk 63 , And it is generated as hard disk management information for playing smoothly, and the generated management information is stored temporarily at the temporary storage memory 58, and the hard disk management information stored temporarily is suitably recorded on the hard disk 63 via the hard disk record reproducer 61.

**0028** Thus, although the video signal which channel selection was made and was received, and above-mentioned hard disk management information are recorded on the hard disk 63, In the time of the video signal supplied and recorded being a signal recorded, for example on other archive media, such as VTR, when the signal is an analog signal, A/D converter 52 is supplied, the same processing is made, and the video signal is recorded on the hard disk 63.

**0029** When the video signals recorded are signals beforehand coded by systems, such as MPEG-2, such as BS digital broadcasting and digital terrestrial broadcasting, for example, The direct stream analyzer 54 and the header detector 56 are supplied without passing MPEG-2 encoder, same signal processing is carried out, and the coded signal is recorded on the hard disk 63.

**0030** When it has a function which can supply the encoded information which the MPEG-2 encoder 53 makes the composition of GOP, etc. in between, Or when encoded information, such as GOP, is supplied as supplementary information by digital broadcasting etc., the information is supplied to the header detector 56, and the header detector 56 generates encoded information based on the information, and it may be made to supply it to the microcomputer 57.

**0031** Thus, analog TV broadcast, digital video broadcast, or the video signal recorded on other recording media is made into the video signal by which compression encoding was carried out, and that video signal is recorded on the hard disk 63 with management information.

**0032** Next, playback of the signal which carried out in this way and was recorded on the hard disk 63 of the Records Department 60 is described. First, when a reproduction button is operated with the remote control 95, the contents of operation are transmitted to the remote control interface 79 by the modulated infrared light line, and the contents of operation of a remote control key are supplied to the microcomputer 76.

**0033** From the microcomputer 76, the control signal generated according to the contents of operation writes in, and the reading control circuit 65 is supplied, The hard disk 63 is controlled by the write-in reading control machine 65, the hard disk 63 reads the signal of the specified part, and the read signal is supplied to the hard disk record reproducer 61.

**0034** In the hard disk record reproducer 61, amplification of the signal read from the hard disk 63, amendment of the characteristic, etc. are performed, and the signal with which the characteristic etc. were amended is supplied to the buffer memory 71.

**0035** There, the signal which the signal by which compression encoding was carried out was stored temporarily, and was stored temporarily according to the demand from MPEG-2 decoder is read, and is supplied to the MPEG-2 decoder 72.

**0036** In the MPEG-2 decoder 72, the supplied signal according to MPEG-2 standard, It is decoded by that compression encoding was carried out with the encoder 53, and a complementary method, **Multiplex of the status signal with which the digital video signal acquired by being decoded is displayed on a display machine by OSD(On Screen Display) 73 if needed** is carried out, The digital video signal with which **multiplex of the status signal** was carried out is supplied to D/A converter 74, and is changed into an analog video signal, and the changed video signal is supplied and displayed on monitor TV90.

**0037** The status signal by which multiplex is carried out to OSD73 here, The signal currently stored in the Video RAM which is built in OSD73, and which is not illustrated, Or it is made as **display / it / on it / carry out multiplex / of the status signal generated based on the information to which the display information information memorized by the temporary storage memory 78 was supplied to OSD73 via the microcomputer 76, and the OSD73 was supplied / to the video signal supplied from the MPEG-2 decoder 72, and**.

**0038** Thus, although the signal which the compression in a frame and motion compensation technology were used and encoded by MPEG-2 system, and the video signal supplied was recorded on the hard disk 63, and was recorded on the hard disk 63 is decoded by MPEG-2 decoder, The picture signal treated by MPEG-2 system which uses the appearance and is made is described.

**0039** The kind of picture treated by MPEG-2 system is shown in drawing 2. In the figure, although the name of I, B, and P is given to the frame image (picture) which constitutes a video

signal and it is arranged in the time direction, the I is the I (Intra-coded) frame (picture) with which frame inner code-ization is made.

**0040**And P is the P (Predictive-coded) frame by which prediction coding is carried out in the one direction as shown by the arrow under a figure, B is the B (Bidirectionally predictive-coded) frame which the both-directions lost-motion estimated vector of the past and the future is called for, and is coded.

**0041**Thus, although the picture coded by MPEG-2 is constituted by the frame image with three kinds of character, For example, although the I frame is arranged every 15 sheets, the set of the frame image of 15 sheets from the I frame to this side where the following I frame is started is called GOP (Group of Picture).

**0042**Since the I frame is decoded and decoding of P and the B frame is made behind, decoding of the image which the GOP carries out that an image is treated as a unit in this way, and is coded is made as **arrange / at the head of GOP / it is necessary to decode the I frame first, and / the I frame**.

**0043**And when decoding of the I frame is not made, decoding of data which acts **that decoding of subsequent p frames and the B frame cannot be performed** as Irikita will wait for and decode the data of the I frame of the next GOP.

**0044**When it comprises N= 15, the interval of GOP at that time 15 frames. Namely, like NTSC (national television system committee color television system). In the case of the video signal whose number is per second 30, the signal of GOP coded by every 0.5 second (15/30=0.5) will be acquired and decoded.

**0045**Therefore, it is made to shorten decoding time using the management information which needs to obtain the data of the beginning of GOP by accessing it in order to read the data recorded, for example on the hard disk 63 and to decode immediately, therefore shows the portion of the beginning of GOP.

**0046**Now, using the management information etc., it is also possible to perform record of a signal and reproductive operation simultaneously in record of the picture signal coded by the hard disk, the video-signal record which performs playback, and playback equipment at high speed, and the record in the position which separated and playback on a hard disk can be performed simultaneously.

**0047**What is called following reproduction that reproduces simultaneously the portion recorded in the past as a function realizable by the simultaneous rec/play while recording the program under present record, And when video audio information is recorded on the bit stream record section for predetermined time one by one and it records to the last of the field, Overwrite new information to the oldest record in a field, it is made to record, and the cash rec/play which can reproduce the video audio information for predetermined time tracing back to the past occurs.

**0048**The cash rec/play is a function reproduced while carrying out time shifting to the image which carried out by **as having reproduced the image immediately after recording**, usually viewed and listened to the reproduced image immediately after record as a real time image, and was recorded on the past from the real-time image by a televiwer's operation continuously.

**0049**Here, although it supposes that the state where it is reproduced as the real time image is called a live state, and carried out, carrying out the sweep of between the live state and images recorded on the past continuously, a change on the past image of a live state from an image needs to be performed smoothly.

**0050**Namely, although using temporarily an input signal to equipment which does not perform encoding of MPEG-2, decoding, and record reproduction processing to a hard disk as it is instead of an image of a live state is also considered, In such a case, between an input signal and a signal of a live state, delay time difference as processing time in coding by MPEG-2, decoding, and record reproduction to a hard disk will arise, and smooth shift cannot be carried out to the past image from the present image (live state).

**0051**Therefore, time discontinuity at the time of a change of a signal when performing reproduction which goes back to the past arises from a real-time viewing-and-listening state especially, An image is confused for a moment or it is displayed like a pattern skipping, It will be made to halt, without disturbing a picture of an image under viewing and listening, moreover it cannot display an image by smooth relation from the present to the past, and unnatural sensibility will be given to a televiwer -- it can be canceled and it cannot be made to reproduce etc..

**0052**So, in cash rec/play in a case of using a hard disk. In order to reproduce an image recorded before a short time, continuing record, it is made as **reproduce / from the present**

**image to the past image / by easy operation / continuously** , and such a regenerative function is realized by reproducing an image of a live state as the present image.

**0053**Next, cash rec/play for realizing a regenerative function of the live state is described further. Record for cash rec/play is a recording mode which records a video signal of the record time specified beforehand on a predetermined field, It is made as **record / the newest video signal / when record is made exceeding the specified record time, as a new video signal is recorded on an old recording part / on a predetermined record section / always** .

**0054**For example, when setting up the cash record time in 1 hour and performing cash rec/play, it can reproduce, carrying out time shifting even of the video signal which went back to the past from a video signal of a live state for a maximum of 1 hour directly.

**0055**It is typically shown in drawing 3 and a bit stream when performing the cash rec/play is explained to it. The figure is what showed a bit stream of a video signal recorded on the hard disk 63, \*\* is a time of having decoded a bit stream read from a hard disk, and \*\* is a time of recording a coded bit stream.

**0056**And (1) shown on the left of \*\* in the figure shows the portion of a bit stream renewable tracing back to the past, and (3) on the right of \*\* shows the field which recorded the bit stream in the past, and it records a new bit stream on this portion one by one.

**0057**\*\* The bit stream of the specified quantity is not stored temporarily at the buffer memory 71 in which the field (2) between \*\* operates, for example as a VBV (video buffering verifier) buffer, . A bit stream cannot be supplied to MPEG-2 decoder. Or it is a field where the data of the amount of bit streams required in order to perform stable decoding operation for the Reason of the quantity of a bit stream required for a decoder to be stabilized and decode an image and a sound not being supplied does not exist.

**0058**Thus, the signal recorded on the hard disk 63 is in the live state of the above-mentioned **the state where playback is impossible unless it is a period of the bit stream field (1) after the specified time elapse shown by (2), and earliest time \*\* of the field (1) is played** .

**0059**Although usually recognizes it as the televiwer viewing and listening without a time delay to the video signal currently broadcast as it is in the live state, It will view and listen to the video signal with which period delay of the encoding time by the encoder 53, the record time of the bit stream of the specified quantity, and the decoding time by the decoder 72 was carried out actually.

**0060**And although a televiwer may perform channel switching operation of that broadcast to which it is viewing and listening, this video-signal recording and reproducing device 40 has restricted a channel change so that it may operate only within a case where it is viewing and listening in the state of the live.

**0061**Namely, when changing a reproduction state into a slow reproduction state later than standard reproduction speed, a pause condition, or a reverse-direction-reproduction state from a live state, Since the past image will be reproduced, it stops being in a live state, and is made as **forbid / when it is not in the live state / a change of a receiving channel** .

**0062**Thus, although change of a receiving channel is enabled in a live state in this recording and reproducing device, Also in such a case, the above-mentioned time delay has arisen between broadcasting hours and display time, and sense of incongruity will be given to a televiwer who does not recognize the time delay to an image of a receiving channel changed by being delayed being displayed.

**0063**Although it is desirable to make change of a receiving channel promptly after channel change operation like the conventional TV viewing and listening of a channel change in a live state for a televiwer as for it, Predetermined time-code-izes a display of a receiving channel change image of a recording and reproducing device in a live state, and it records, reproduces, and is because it cannot display that it is not the decoded image.

**0064**Thus, although predetermined time is needed for change of the receiving channel in a live state, the image on which it was confused at the time of the post-channel change as which the image before change was displayed is displayed, and, as for the image then displayed, the receiving channel image after a change normal after that is displayed.

**0065**The disorder of the video signal at the time of the channel change, For example, regular coding and decoding are not made and the signal which is not regular is being considered as the disordered signal and displayed etc. until the synchronization time relation of the video signal between broadcasting stations is not in agreement, a channel is changed and the synchronization of an encoder etc. suits the signal of a new receiving channel.

**0066**Although the disorder of the signal at the time of this channel change is a case where the signal received is analog broadcasting, In the digital broadcasting reception coded and broadcast by MPEG-2 system, a regular image cannot be acquired until the signal of the above-mentioned I frame is decoded, the disordered image for about 0.5 second is usually decoded, and the behind normal image is decoded.

**0067**Next, it does in this way and disorder of the signal at the time of the channel change to produce is described further. Drawing 4 shows typically the state of the image displayed at the time of a channel change on a time-axis.

**0068**In the figure, as for a field (11), a channel change and an inner disordered image are recorded and (12) by which receiving channel A is received is the section when a video signal of a channel with which (13) was changed is recorded normally.

**0069**Namely, \*\* is a time of being decoded by MPEG-2 decoder, after a signal read from a hard disk is primarily accumulated in the buffer memory 71, It is \*\* of this side at the present time when a bit stream is recorded, and is a time of it being supposed that normal image of \*\* of a changed channel is refreshable.

**0070**Although a disordered image produced in such a period can be carried out as **display / by carrying out mute in the meantime / the disordered image**, When the mute picture is a mute picture of a single color, a desirable still more desirable picture as a picture for entertainment needs to be displayed, and it states below.

**0071**The method of presentation at the time of a channel change is illustrated and explained to drawing 5. In the figure, it is \*\* at the channel change operation time, and cases in a live state where channel change operation can be performed are \*\* and identical time a time of having decoded now which was shown in above-mentioned drawing 4.

**0072**And decoding start point \*\* is set up for pause starting point \*\* after a start of a field (23) before **of a field (21)** a field (22) again, and let between \*\* and \*\* be the section of pose image reproduction of the channel A.

**0073**Next, a display example at the time of a channel change performed by doing in this way is described. First, when remote control 95 grade is operated in time \*\* and a receiving channel is set to B from A, That is, it is a time of finishing writing an image of the channel A to a field (11) then, and the remote control interface 79 which detected operation then made by the remote control 95 supplies the operation information to the TV tuner 51, and the operation information is supplied to OSD73.

**0074**Operation of a channel change is received, multiplex **of the OSD73 to which the operation information was supplied** is carried out to a video signal to which a message of a purport that it is during receiving preparation of the channel B is supplied from the MPEG-2 decoder 72, and multiplex information of OSD73 is displayed on monitor TV90.

**0075**Since a field (11) carries out renewal of period of the image of the channel A and it is shown to a televiwer, a display of this field (11) is continued, and even if a televiwer is a period when a receiving channel is not updated, he can recognize that it is a preparatory state of channel B reception by multiplex information of OSD.

**0076**Next, reproduction of a field (11) in time \*\* of this side to end the MPEG-2 decoder 72, It is considered as a pause screen reproduction state, an image area (12) ends a moving-image-reproduction state of the channel A from time of \*\* in the middle of under channel change, and a pause screen of the period channel A to time **of a normal image being acquired** \*\* is supplied by making a part of receiving channel video signal into a pose image signal.

**0077**And after time \*\*, MPEG-2 decoder decodes a normal image of the channel B, it is made as **supply / to a display machine / the image**, and multiplex information by OSD73 is also called off and processing of a channel change ends it.

**0078**Thus, since the channel change time indicator of the pause screen is carried out, For example, a local-oscillator-frequency change period of the TV tuner 51 produced at the time of a channel change, Change processing to the channels A or B is made with a beautiful image, without displaying an image on which it was confused at the time of a channel change produced by synchronization-signal-processing period of a television signal received with a different synchronized signal, and other causes.

**0079**And although a time delay for about 3 seconds arises and is displayed in the state of the live at the time of cash rec/play in an example of the video-signal recording and reproducing device 40 as shown in above-mentioned drawing 1, it is the time sensed long for a televiwer for these 3 seconds.

**0080**So, in above-mentioned working example, the interval of the waiting time which a televiwer senses is shortened by after channel change operation displaying the image of the

between channel A from \*\* to \*\* with an animation, and shortening the display time of a pose image.

**0081**Thus, change processing can be performed for a receiving channel to B from A, without operating the remote control 95 and displaying the picture which is not normal. Next, operation in case operation of the channel change is performed by button grabbing of the number of times of plurality is described.

**0082**That the channel change is performed by button grabbing of multiple times is a case where a channel switching button is made by a rise and down operation etc., when two or more button grabbing performs channel specification of two or more figures, for example. When based on the up-and-down operation, channel selection is made for the multiple-times operation of the button +1 or by taking -1, and selection operation of the target receiving channel is carried out.

**0083**When a channel change is made by such operation, whenever a channel changes, disorder arises in a video signal as mentioned above. Then, when a channel switching button is operated continuously many times, the meantime is made into the period which displays the image of a pause condition and continuation channel change operation is completed in this way, The cash rec/play image over the receiving channel signal chosen eventually is displayed.

**0084**And the field in which cache reproduction is possible, i.e., the past image section which can be displayed while carrying out time shifting continuously, is made into a field (13), and specification is updated for the starting point of the section, for example in the position of \*\* from cash reproducible position **of the channel A** \*\*.

**0085**Thus, the equipment which can perform cash rec/play can be constituted, operating a receiving channel. Although the number of receiving channels at that time described 1 as an example, it can also constitute the equipment which records those input signals, receiving the signal of two or more channels using a hard disk with a quick access speed.

**0086**In that case, what is necessary is just to also depend channel setting when such on the same method and composition, although it has two or more Records Department 50 or the function which records two or more bit streams on the hard disk 63 by frequency division operation etc. receiving two or more input signals etc. is realized.

**0087**As mentioned above, although the signal broadcast was received and the composition and its operation of the recording and reproducing systems of a video signal which perform cash rec/play, and a video-signal recording and reproducing device were described, There is the method of constituting the regenerating section 70 as a video signal recorder which comprises the Records Department 50 and the medium part 60 in the video signal recorder 40 as video-signal playback equipment.

**0088**The equipment which installs those video signal recorders and video-signal playback equipment in a different place, and is installed in those distant places is a case where join together by a home network etc. and it is made to operate.

**0089**The video signal recorder at that time is made into a home server, and is installed in a home, video-signal playback equipment is connected to the home server by a home network, and the video-signal playback equipment is installed as two or more set top boxes for every room in which a monitor TV is installed.

**0090**In this case, that home server as a bit stream sending device, A set top box is constituted as a bit stream receiving terminal, The video-signal information recorded on a hard disk while it is combined by high-speed wireless LAN or home LAN and both perform two-way communication by the operating instructions from each part store. Monitor TV to which the target bit stream views and listens via the set top box which a user operates is supplied, and it is made to be displayed in the decoded video signal.

**0091**Thus, the recording equipment and the regenerating section as a transmit terminal and a receiving terminal are installed in the distant place, and when making it operate unitedly by a means of communication, two or more transmit terminals and two or more receiving terminals will constitute the network form visual system which is combined in a network and operated.

**0092**Although a recording medium used for a medium part was described centering on a hard disk, a recording medium is applicable also to equipment using other recording media, such as a medium in which rapid access is possible, for example, a magneto-optical disc, a RAM form or DVD of RW form, and a semiconductor memory form recording medium.

**0093**Although MPEG-2 system was described as an example, a coding mode of a video signal, A method of compression encoding may use a compression method of a method not only by this but formation of a frame inner code commonly called Motion-JPEG or MPEG-4 system, MPEG-7 system, MPEG-21 system with which standardization will be started from now on, and

other fractals.

**0094**

**Effect of the Invention** While the cash rec/play function is performing record of a video signal, and reproduction according to the invention according to claim 1, when the change operating of a receiving channel is made, Continue reproduction of the video signal which is under reception, and the information on the purport that it is during change processing about a receiving channel is displayed on a display screen, Having displayed the image of a receiving channel new when reproduction by the cash rec/play function of the changed receiving channel is enabled A sake, Even if it is a case where the reproduced image by the cash rec/play function in which carry out a specified time lag to channel switching operation, and the image of a new channel is displayed is being displayed, Since it can report that a channel change command is received by the televiwer who is operating the button, and it is **channel change** under processing, It is effective in the ability to provide the recording and reproducing systems of a video signal which have a function of the cash rec/play to which it can view and listen continuously, performing time shifting operation to the image recorded on the past from the live image by smooth operation.

**0095** The period when according to the invention according to claim 2 in addition to the effect according to claim 1 the change operating of a receiving channel is made in and the change processing of a receiving channel is made, Since he is trying to display the video signal or its pose image signal before a refreshable channel change with a cash rec/play function, The video signal of the channel changed by the normal picture can be displayed without reproducing the disordered video signal produced at the time of a channel change, It is effective in the ability to provide the recording and reproducing systems of a video signal which have the cash rec/play function that it can view and listen even to the image recorded on the past from the live image by smooth operation continuously by time shifting operation.

**0096** And when the change operating of a receiving channel is made with the video-signal recording and reproducing device which is performing record of a video signal, and reproduction with a cash rec/play function according to the invention according to claim 3, Continue reproduction of the video signal which is under reception, and the information on the purport that it is during change processing about a receiving channel is displayed on a display screen, Having displayed the image of a receiving channel new when reproduction by the cash rec/play function of the changed receiving channel is enabled A sake, Even if it is a case where the image by the cash rec/play function in which the image which carried out the specified time lag to channel switching operation is displayed is being displayed, Since it can report that a channel change command is received by the televiwer who operated it, and a button is **channel change** under processing, It is effective in the ability to provide the composition of the recording and reproducing device of the video signal which has the cash rec/play function that it can view and listen even to the image recorded on the past from the live image by smooth operation continuously by time shifting operation.

**0097** The period when according to the invention according to claim 4 in addition to the effect according to claim 3 the change operating of a receiving channel is made in and the change processing of a receiving channel is made, Having displayed the video signal or its pose image signal of the refreshable channel before change with a cash rec/play function A sake, The video signal of the channel changed by the normal picture can be displayed without reproducing the disordered video signal produced at the time of a channel change, It is effective in the ability to provide the composition of the recording and reproducing device of the video signal which has the cash rec/play function that it can view and listen even to the image recorded on the past from the live image by smooth operation continuously by time shifting operation.

**0098** According to the invention according to claim 5, it adds to the effect according to claim 3, Having displayed the video signal or its pose image signal of the refreshable channel before change with a cash rec/play function during the period until the change operating of a receiving channel is made continuously and the change processing of a receiving channel is decided A sake, The video signal of the channel which changed by the normal picture and was decided can be displayed without reproducing the disordered video signal produced at the time of a channel change, It is effective in the ability to provide the composition of the recording and reproducing device of the video signal which has the cash rec/play function that it can view and listen even to the image recorded on the past from the live image by smooth operation continuously by time shifting operation.

**Field of the Invention** This invention sets up a receiving channel, acquires the image of TV broadcast, and an audio signal, and records them on recording media, such as a hard disk, and it relates to the recording and reproducing systems and the video-signal recording and reproducing device of the video signal which has the simultaneous record reproduction function made as **read / the video signal immediately after / that / recording**.

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**Description of the Prior Art** The video-signal recording and reproducing device using the information signal recording medium in which random access, such as a hard disk, is possible as a recording medium, Since the access time for record and reproduction is short, it has a function of two or more programs of TV broadcast being recorded simultaneously, and being able to perform record and reproduction of a video signal simultaneously.

**0003** And the video-signal recording and reproducing device which has such a simultaneous record reproduction function, It has convenient functions, such as cache reproduction to which it can view and listen while carrying out time shifting of the program under broadcast to the past continuously from the present, and groupie reproduction, and it is thought that it will be introduced into a home from now on with VTR used as a conventional time shifting machine.

**0004** Although the monitor of the record signal in the conventional VTR is made as **listen / supply directly the signal of TV tuner built in VTR to monitor TV, and / to it / view and** and the monitor of the signal which the monitor picture has in the middle of record can be performed, It cannot be known whether it is in how it is actually recorded on videotape, the image quality deterioration of the recorded video image, and the state where record is not made by a certain cause.

**0005** In the recording and reproducing device which has a simultaneous record reproduction function to it, since it is recordable, reproducing the image under record in real time, it can know then also about the fault at the time of record, and a recording mistake can be pressed down to minimum.

**0006** When an image to see again or the overlooked image is during record, The function of the record reproduction performed using a hard disk -- the past image can be seen -- by simple operation is a function convenient for a televiwer, and PVR (personal video recorder) which carries such a function is also developed.

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**Effect of the Invention** While the cash rec/play function is performing record of a video signal, and reproduction according to the invention according to claim 1, when the change operating of a receiving channel is made, Continue reproduction of the video signal which is under reception, and the information on the purport that it is during change processing about a receiving channel is displayed on a display screen, Having displayed the image of a receiving channel new when reproduction by the cash rec/play function of the changed receiving channel is enabled A sake, Even if it is a case where the reproduced image by the cash rec/play function in which carry out a specified time lag to channel switching operation, and the image of a new channel is displayed is being displayed, Since it can report that a channel change command is received by the televiwer who is operating the button, and it is **channel change** under processing, It is effective in the ability to provide the recording and reproducing systems of a video signal which have a function of the cash rec/play to which it can view and listen continuously, performing time shifting operation to the image recorded on the past from the live image by smooth operation.

**0095** The period when according to the invention according to claim 2 in addition to the effect according to claim 1 the change operating of a receiving channel is made in and the change processing of a receiving channel is made, Since he is trying to display the video signal or its pose image signal before a refreshable channel change with a cash rec/play function, The video signal of the channel changed by the normal picture can be displayed without reproducing the disordered video signal produced at the time of a channel change, It is effective in the ability to provide the recording and reproducing systems of a video signal which have the cash rec/play function that it can view and listen even to the image recorded on the past from the live image by smooth operation continuously by time shifting operation.

**0096** And when the change operating of a receiving channel is made with the video-signal

recording and reproducing device which is performing record of a video signal, and reproduction with a cash rec/play function according to the invention according to claim 3, Continue reproduction of the video signal which is under reception, and the information on the purport that it is during change processing about a receiving channel is displayed on a display screen, Having displayed the image of a receiving channel new when reproduction by the cash rec/play function of the changed receiving channel is enabled A sake, Even if it is a case where the image by the cash rec/play function in which the image which carried out the specified time lag to channel switching operation is displayed is being displayed, Since it can report that a channel change command is received by the televiwer who operated it, and a button is **channel change** under processing, It is effective in the ability to provide the composition of the recording and reproducing device of the video signal which has the cash rec/play function that it can view and listen even to the image recorded on the past from the live image by smooth operation continuously by time shifting operation.

**0097**The period when according to the invention according to claim 4 in addition to the effect according to claim 3 the change operating of a receiving channel is made in and the change processing of a receiving channel is made, Having displayed the video signal or its pose image signal of the refreshable channel before change with a cash rec/play function A sake, The video signal of the channel changed by the normal picture can be displayed without reproducing the disordered video signal produced at the time of a channel change, It is effective in the ability to provide the composition of the recording and reproducing device of the video signal which has the cash rec/play function that it can view and listen even to the image recorded on the past from the live image by smooth operation continuously by time shifting operation.

**0098**According to the invention according to claim 5, it adds to the effect according to claim 3, Having displayed the video signal or its pose image signal of the refreshable channel before change with a cash rec/play function during the period until the change operating of a receiving channel is made continuously and the change processing of a receiving channel is decided A sake, The video signal of the channel which changed by the normal picture and was decided can be displayed without reproducing the disordered video signal produced at the time of a channel change, It is effective in the ability to provide the composition of the recording and reproducing device of the video signal which has the cash rec/play function that it can view and listen even to the image recorded on the past from the live image by smooth operation continuously by time shifting operation.

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**Problem to be solved by the invention**By the way, although the hard disk is a recording medium which can do random access at high speed, As for the signal which the signal by which compression encoding was carried out with mark systems, such as MPEG, is recorded, records the video signal recorded on the medium, and is reproduced, being made as **obtain / decode and / a video signal** is common.

**0008**Although accelerated by progress of semiconductor technology, the processing speed for performing such compression encoding and decoding processing, The processing time for about several seconds was required at present, and even if the processing time was a case where a monitor signal was acquired by simultaneous record reproduction, it had SUBJECT which the signal delay more than the time produces.

**0009**Then, although this invention can consider that the operation performance of equipment deteriorates in the video-signal recording and reproducing device which has such a convenient function when the video signal outputs for a monitor carry out a specified time lag, . Also by the time delay, there is no inferiority in operativity and the video signal which is under record now can be monitored in real time. Toward the image recorded in the past, can do reproduction continuously and the image under present viewing and listening is halted, And it is going to provide offer of the recording and reproducing systems of the video signal which carries the convenient function of being able to resume reproduction, without disturbing an image (seamlessly), and the composition of the video-signal recording and reproducing device provided with those functions.

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**Means for solving problem**The video signal recorder, the video-signal playback equipment, and the video-signal recording and reproducing device of this invention comprise the following

means of 1-5, in order to solve an aforementioned problem, namely **00111**) Record the video signal produced by receiving the set-up receiving channel on the recording medium in which random access is possible, and. In the recording and reproducing systems of the video signal which reproduces said video signal immediately after recording, The 1st step (95, 79) that generates a receiving channel change signal when change operating of said receiving channel is carried out, When the receiving channel change signal generated by the 1st step is acquired, The receiving channel video signal recorded on said recording medium before the change operating of a receiving channel, And/or, the 2nd step (72, 73) that supplies a video signal as an output signal during change concerning the information which shows that a receiving channel is under change, Recording and reproducing systems of the video signal continuing to a video signal during the change in the 2nd step, and having at least the 3rd step (72) that supplies the receiving channel video signal recorded, and reproduced and obtained by said recording medium after the change operating of a receiving channel as an output signal.

**00122**) Recording and reproducing systems of the video signal given in 1 clause making said 2nd step as **supply / supply the receiving channel video signal before receiving channel change operating as a predetermined time moving image signal, and / the pose image signal behind generated from said receiving channel video signal**.

**00133**) Record the video signal produced by receiving the set-up receiving channel on the recording medium in which random access is possible, and. In the video-signal recording and reproducing device which reads said video signal immediately after recording, and outputs the video signal produced by reading, A receiving channel setting-out means (95, 79) to generate a receiving channel change signal when change operating of said receiving channel is carried out, When the receiving channel change signal generated by the receiving channel setting-out means is supplied, . Read the receiving channel video signal recorded on said recording medium before the change operating of a receiving channel from said recording medium, and supply it. And/or, a video-signal recording and reproducing device providing at least the signal supply means (65, 63, 61, 71, 72, 73) which generates and supplies the picture signal which shows that a receiving channel is changing, and constituting it.

**00144**) A video-signal recording and reproducing device given in 3 clauses constituting it so that a part of the receiving channel video signal may be supplied as a pose image signal after said signal supply means reproduces the receiving channel video signal before said receiving channel change as a moving image signal.

**00155**) When setting out of a receiving channel is made continuously two or more times, until it carries out specified time elapse of said signal supply means from the end of setting out, A receiving channel video signal before said receiving channel change reproduced from the reproduction means of said recording medium at least, or a video-signal recording and reproducing device given in 3 clauses constituting so that a part of the video signal may be supplied.

## **0016**

**Mode for carrying out the invention** Hereafter, desirable working example explains about the recording and reproducing systems of the video signal of this invention, and the embodiment of a video-signal recording and reproducing device. A video signal is recorded on a hard disk, the schematic block diagram of the video-signal recording and reproducing device to play is shown in drawing 1, and the composition and operation are outlined.

**0017** In the figure, this video-signal recording and reproducing device 40 consists of the Records Department 50, the medium part 60, and the regenerating section 70, monitor TV90 is connected by the cable and the remote control 95 is connected to the regenerating section 70 by infrared rays.

**0018** And the Records Department 50 comprises the TV tuner 51, A/D converter 52, the MPEG-2 encoder 53, the stream analyzer 54, REC-FIFO55, the header detector 56, the microcomputer 57, and the temporary storage memory 58.

**0019** The medium part 60 from the hard disk record reproducer 61, the hard disk 63, and the write-in reading control machine 65. And the regenerating section 70 comprises the buffer memory 71, the MPEG-2 decoder 72, OSD73, D/A converter 74, the microcomputer 76, the temporary storage memory 78, and the remote control interface 79.

**0020** Next, operation of the video-signal recording and reproducing device 40 constituted by this appearance is outlined. First, the infrared signal with which the remote control 95 was operated and TV channel to receive was modulated from the remote control 95 emits light, and the receiving channel information which the infrared signal was received by the remote control interface 79, and was acquired by being received is supplied to the TV tuner 51.

**0021**The video signal which the TV tuner 51 receives the signal of a receiving channel based on the receiving channel information supplied among the broadcasting electric-waves which carry out ingress from an antenna, and is acquired by receiving is supplied to A/D converter 52, is changed into a digital signal and supplied to the MPEG-2 encoder 53.

**0022**In the MPEG-2 encoder 53. The supplied signal ISO/IEC. (International Organization.) for Standardization. Compression encoding is carried out according to MPEG-2 (moving picture experts group- 2) standards defined by /International Electrotechnical Commission, The signal with which the compression encoding was carried out is supplied to the stream analyzer 54 and the below-mentioned header detector 56.

**0023**In the stream analyzer 54, the encoded information signal acquired by analyzing the form of the signal by which compression encoding was carried out, and analyzing, and the supplied compression coded signal are supplied to REC-FIFO55.

**0024**It is a circuit which REC-FIFO55 stores temporarily the signal into which it FIFO(first in first out )-operates, namely, the signal for record (recording) is inputted, and outputs the signal to the supplied order, The signal supplied from this circuit is supplied to the hard disk record reproducer 61.

**0025**It is considered as the signal divided for every sector size for recording the supplied signal on the hard disk 63 in the hard disk record reproducer 61, The divided signal is supplied to the hard disk 63 by which motion control is carried out to the write-in read-out controller 65, and the supplied signal is recorded on the disc-like recording medium which the hard disk 63 does not illustrate.

**0026**And the above-mentioned header detector 56 is supplied from the signal coded by MPEG-2, for example as encoded information in connection with the data configuration of GOP (Group of Picture), and the supplied encoded information is supplied to the microcomputer 57.

**0027**Record of information **in / based on the encoded information supplied in the microcomputer 57 / the hard disk 63** , And it is generated as hard disk management information for playing smoothly, and the generated management information is stored temporarily at the temporary storage memory 58, and the hard disk management information stored temporarily is suitably recorded on the hard disk 63 via the hard disk record reproducer 61.

**0028**Thus, although the video signal which channel selection was made and was received, and above-mentioned hard disk management information are recorded on the hard disk 63, In the time of the video signal supplied and recorded being a signal recorded, for example on other archive media, such as VTR, when the signal is an analog signal, A/D converter 52 is supplied, the same processing is made, and the video signal is recorded on the hard disk 63.

**0029**When the video signals recorded are signals beforehand coded by systems, such as MPEG-2, such as BS digital broadcasting and digital terrestrial broadcasting, for example, The direct stream analyzer 54 and the header detector 56 are supplied without passing MPEG-2 encoder, same signal processing is carried out, and the coded signal is recorded on the hard disk 63.

**0030**When it has a function which can supply the encoded information which the MPEG-2 encoder 53 makes the composition of GOP, etc. in between, Or when encoded information, such as GOP, is supplied as supplementary information by digital broadcasting etc., the information is supplied to the header detector 56, and the header detector 56 generates encoded information based on the information, and it may be made to supply it to the microcomputer 57.

**0031**Thus, analog TV broadcast, digital video broadcast, or the video signal recorded on other recording media is made into the video signal by which compression encoding was carried out, and that video signal is recorded on the hard disk 63 with management information.

**0032**Next, playback of the signal which carried out in this way and was recorded on the hard disk 63 of the Records Department 60 is described. First, when a reproduction button is operated with the remote control 95, the contents of operation are transmitted to the remote control interface 79 by the modulated infrared light line, and the contents of operation of a remote control key are supplied to the microcomputer 76.

**0033**From the microcomputer 76, the control signal generated according to the contents of operation writes in, and the reading control circuit 65 is supplied, The hard disk 63 is controlled by the write-in reading control machine 65, the hard disk 63 reads the signal of the specified part, and the read signal is supplied to the hard disk record reproducer 61.

**0034**In the hard disk record reproducer 61, amplification of the signal read from the hard disk 63, amendment of the characteristic, etc. are performed, and the signal with which the characteristic etc. were amended is supplied to the buffer memory 71.

**0035** There, the signal which the signal by which compression encoding was carried out was stored temporarily, and was stored temporarily according to the demand from MPEG-2 decoder is read, and is supplied to the MPEG-2 decoder 72.

**0036** In the MPEG-2 decoder 72, a supplied signal according to MPEG-2 standard, It is decoded by that compression encoding was carried out with the encoder 53, and a complementary method, **Multiplex of the status signal with which a digital video signal acquired by being decoded is displayed on a display machine by OSD(On Screen Display) 73 if needed** is carried out, A digital video signal with which multiplex **of the status signal** was carried out is supplied to D/A converter 74, and is changed into an analog video signal, and a changed video signal is supplied and displayed on monitor TV90.

**0037** A status signal by which multiplex is carried out to OSD73 here, A signal currently stored in a Video RAM which is built in OSD73, and which is not illustrated, Or it is made as **display / it / on it / carry out multiplex / of the status signal generated based on information to which display information information memorized by the temporary storage memory 78 was supplied to OSD73 via the microcomputer 76, and the OSD73 was supplied / to a video signal supplied from the MPEG-2 decoder 72, and .**

**0038** Thus, although a signal which compression in a frame and motion compensation technology were used and encoded by MPEG-2 system, and a video signal supplied was recorded on the hard disk 63, and was recorded on the hard disk 63 is decoded by MPEG-2 decoder, A picture signal treated by MPEG-2 system which uses the appearance and is made is described.

**0039** The kind of picture treated by MPEG-2 system is shown in drawing 2. In the figure, although the name of I, B, and P is given to the frame image (picture) which constitutes a video signal and it is arranged in the time direction, the I is the I (Intra-coded) frame (picture) with which frame inner code-ization is made.

**0040** And P is the P (Predictive-coded) frame by which prediction coding is carried out in the one direction as shown by the arrow under a figure, B is the B (Bidirectionally predictive-coded) frame which the both-directions lost-motion estimated vector of the past and the future is called for, and is coded.

**0041** Thus, although the picture coded by MPEG-2 is constituted by the frame image with three kinds of character, For example, although the I frame is arranged every 15 sheets, the set of the frame image of 15 sheets from the I frame to this side where the following I frame is started is called GOP (Group of Picture).

**0042** Since the I frame is decoded and decoding of P and the B frame is made behind, decoding of the image which the GOP carries out that an image is treated as a unit in this way, and is coded is made as **arrange / at the head of GOP / it is necessary to decode the I frame first, and / the I frame .**

**0043** And when decoding of the I frame is not made, decoding of data which acts **that decoding of subsequent p frames and the B frame cannot be performed** as Irikita will wait for and decode the data of the I frame of the next GOP.

**0044** When it comprises N= 15, the interval of GOP at that time 15 frames. Namely, like NTSC (national television system committee color television system). In the case of the video signal whose number is per second 30, the signal of GOP coded by every 0.5 second (15/30=0.5) will be acquired and decoded.

**0045** Therefore, it is made to shorten decoding time using the management information which needs to obtain the data of the beginning of GOP by accessing it in order to read the data recorded, for example on the hard disk 63 and to decode immediately, therefore shows the portion of the beginning of GOP.

**0046** Now, using the management information etc., it is also possible to perform record of a signal and reproductive operation simultaneously in record of the picture signal coded by the hard disk, the video-signal record which performs playback, and playback equipment at high speed, and the record in the position which separated and playback on a hard disk can be performed simultaneously.

**0047** What is called following reproduction that reproduces simultaneously the portion recorded in the past as a function realizable by the simultaneous rec/play while recording the program under present record, And when video audio information is recorded on the bit stream record section for predetermined time one by one and it records to the last of the field, Overwrite new information to the oldest record in a field, it is made to record, and the cash rec/play which can reproduce the video audio information for predetermined time tracing back to the past occurs.

**0048** The cash rec/play is a function reproduced while carrying out time shifting to the image

which carried out by **as having reproduced the image immediately after recording** , usually viewed and listened to the reproduced image immediately after record as a real time image, and was recorded on the past from the real-time image by a televiwer's operation continuously.

**0049**Here, although it supposes that the state where it is reproduced as the real time image is called a live state, and carried out, carrying out the sweep of between the live state and the images recorded on the past continuously, the change on the past image of a live state from an image needs to be performed smoothly.

**0050**Namely, although using temporarily the input signal to the equipment which does not perform encoding of MPEG-2, decoding, and record reproduction processing to a hard disk as it is instead of the image of a live state is also considered, In such a case, between an input signal and the signal of a live state, the delay time difference as processing time in the coding by MPEG-2, decoding, and the record reproduction to a hard disk will arise, and smooth shift cannot be carried out to the past image from the present image (live state).

**0051**Therefore, the time discontinuity at the time of the change of a signal when performing reproduction which goes back to the past arises from a real-time viewing-and-listening state especially, An image is confused for a moment or it is displayed like a pattern skipping, It will be made to halt, without disturbing the picture of the image under viewing and listening, moreover it cannot display the image by smooth relation from the present to the past, and unnatural sensibility will be given to a televiwer -- it can be canceled and it cannot be made to reproduce etc..

**0052**So, in the cash rec/play in the case of using a hard disk. In order to reproduce the image recorded before a short time, continuing record, it is made as **reproduce / from the present image to the past image / by easy operation / continuously** , and such a regenerative function is realized by reproducing the image of a live state as the present image.

**0053**Next, the cash rec/play for realizing the regenerative function of the live state is described further. The record for cash rec/play is a recording mode which records the video signal of the record time specified beforehand on a predetermined field, It is made as **record / the newest video signal / when record is made exceeding the specified record time, as a new video signal is recorded on an old recording part / on a predetermined record section / always** .

**0054**For example, when setting up the cash record time in 1 hour and performing cash rec/play, it can reproduce, carrying out time shifting even of the video signal which went back to the past from the video signal of a live state for a maximum of 1 hour directly.

**0055**It is typically shown in drawing 3 and a bit stream when performing the cash rec/play is explained to it. The figure is what showed the bit stream of the video signal recorded on the hard disk 63, \*\* is a time of having decoded the bit stream read from the hard disk, and \*\* is a time of recording the coded bit stream.

**0056**And (1) shown on the left of \*\* in the figure shows the portion of a bit stream renewable tracing back to the past, and (3) on the right of \*\* shows the field which recorded the bit stream in the past, and it records a new bit stream on this portion one by one.

**0057**\*\* The bit stream of the specified quantity is not stored temporarily at the buffer memory 71 in which the field (2) between \*\* operates, for example as a VBV (video buffering verifier) buffer, . A bit stream cannot be supplied to MPEG-2 decoder. Or it is a field where the data of the amount of bit streams required in order to perform stable decoding operation for the Reason of the quantity of a bit stream required for a decoder to be stabilized and decode an image and a sound not being supplied does not exist.

**0058**Thus, the signal recorded on the hard disk 63 is in the live state of the above-mentioned **the state where playback is impossible unless it is a period of the bit stream field (1) after the specified time elapse shown by (2), and earliest time \*\* of the field (1) is played** .

**0059**Although usually recognizes it as the televiwer viewing and listening without a time delay to the video signal currently broadcast as it is in the live state, It will view and listen to the video signal with which period delay of the encoding time by the encoder 53, the record time of the bit stream of the specified quantity, and the decoding time by the decoder 72 was carried out actually.

**0060**And although a televiwer may perform channel switching operation of that broadcast to which it is viewing and listening, this video-signal recording and reproducing device 40 has restricted a channel change so that it may operate only within a case where it is viewing and listening in the state of the live.

**0061**Namely, when changing a reproduction state into a slow reproduction state later than standard reproduction speed, a pause condition, or a reverse-direction-reproduction state from a live state, Since the past image will be reproduced, it stops being in a live state, and is made as **forbid / when it is not in the live state / a change of a receiving channel** .

**0062**Thus, although change of a receiving channel is enabled in a live state in this recording and reproducing device, Also in such a case, the above-mentioned time delay has arisen between broadcasting hours and display time, and sense of incongruity will be given to a televiwer who does not recognize the time delay to an image of a receiving channel changed by being delayed being displayed.

**0063**Although it is desirable to make change of a receiving channel promptly after channel change operation like the conventional TV viewing and listening of a channel change in a live state for a televiwer as for it, Predetermined time-code-izes a display of a receiving channel change image of a recording and reproducing device in a live state, and it records, reproduces, and is because it cannot display that it is not the decoded image.

**0064**Thus, although predetermined time is needed for change of the receiving channel in a live state, the image on which it was confused at the time of the post-channel change as which the image before change was displayed is displayed, and, as for the image then displayed, the receiving channel image after a change normal after that is displayed.

**0065**The disorder of the video signal at the time of the channel change, For example, regular coding and decoding are not made and the signal which is not regular is being considered as the disordered signal and displayed etc. until the synchronization time relation of the video signal between broadcasting stations is not in agreement, a channel is changed and the synchronization of an encoder etc. suits the signal of a new receiving channel.

**0066**Although the disorder of the signal at the time of this channel change is a case where the signal received is analog broadcasting, In the digital broadcasting reception coded and broadcast by MPEG-2 system, a regular image cannot be acquired until the signal of the above-mentioned I frame is decoded, the disordered image for about 0.5 second is usually decoded, and the behind normal image is decoded.

**0067**Next, it does in this way and disorder of the signal at the time of the channel change to produce is described further. Drawing 4 shows typically the state of the image displayed at the time of a channel change on a time-axis.

**0068**In the figure, as for a field (11), the channel change and the inner disordered image are recorded and (12) by which receiving channel A is received is the section when the video signal of the channel with which (13) was changed is recorded normally.

**0069**Namely, \*\* is a time of being decoded by MPEG-2 decoder, after the signal read from the hard disk is primarily accumulated in the buffer memory 71, It is \*\* of this side at the present time when the bit stream is recorded, and is a time of it being supposed that the normal image of \*\* of the changed channel is refreshable.

**0070**Although the disordered image produced in such a period can be carried out as **display / by carrying out mute in the meantime / the disordered image** , When the mute picture is a mute picture of a single color, the desirable still more desirable picture as a picture for entertainment needs to be displayed, and it states below.

**0071**The method of presentation at the time of a channel change is illustrated and explained to drawing 5. In the figure, it is \*\* at the channel change operation time, and the cases in the live state where channel change operation can be performed are \*\* and identical time the time of having decoded now which was shown in above-mentioned drawing 4.

**0072**And decoding start point \*\* is set up for pause starting point \*\* after a start of a field (23) before **of a field (21)** a field (22) again, and let between \*\* and \*\* be the section of pose image reproduction of the channel A.

**0073**Next, a display example at the time of a channel change performed by doing in this way is described. First, when remote control 95 grade is operated in time \*\* and a receiving channel is set to B from A, That is, it is a time of finishing writing an image of the channel A to a field (11) then, and the remote control interface 79 which detected operation then made by the remote control 95 supplies the operation information to the TV tuner 51, and the operation information is supplied to OSD73.

**0074**Operation of a channel change is received, multiplex **of the OSD73 to which the operation information was supplied** is carried out to a video signal to which a message of a purport that it is during receiving preparation of the channel B is supplied from the MPEG-2 decoder 72, and multiplex information of OSD73 is displayed on monitor TV90.

**0075**Since a field (11) carries out renewal of period of the image of the channel A and it is

shown to a televiwer, a display of this field (11) is continued, and even if a televiwer is a period when a receiving channel is not updated, he can recognize that it is a preparatory state of channel B reception by multiplex information of OSD.

**0076** Next, reproduction of a field (11) in time \*\* of this side to end the MPEG-2 decoder 72, It is considered as a pause screen reproduction state, an image area (12) ends the moving-image-reproduction state of the channel A from the time of \*\* in the middle of under channel change, and the pause screen of the period channel A to time **of a normal image being acquired** \*\* is supplied by making a part of receiving channel video signal into a pose image signal.

**0077** And after time \*\*, MPEG-2 decoder decodes the normal image of the channel B, it is made as **supply / to a display machine / the image**, and the multiplex information by OSD73 is also called off and processing of a channel change ends it.

**0078** Thus, since the channel change time indicator of the pause screen is carried out, For example, the local-oscillator-frequency change period of the TV tuner 51 produced at the time of a channel change, The change processing to the channels A or B is made with a beautiful image, without displaying the image on which it was confused at the time of the channel change produced by the synchronization-signal-processing period of the television signal received with a different synchronized signal, and other causes.

**0079** And although the time delay for about 3 seconds arises and is displayed in the state of the live at the time of cash rec/play in the example of the video-signal recording and reproducing device 40 as shown in above-mentioned drawing 1, it is the time sensed long for a televiwer for these 3 seconds.

**0080** So, in above-mentioned working example, the interval of the waiting time which a televiwer senses is shortened by after channel change operation displaying the image of the between channel A from \*\* to \*\* with an animation, and shortening the display time of a pose image.

**0081** Thus, change processing can be performed for a receiving channel to B from A, without operating the remote control 95 and displaying the picture which is not normal. Next, operation in case operation of the channel change is performed by button grabbing of the number of times of plurality is described.

**0082** That the channel change is performed by button grabbing of multiple times is a case where a channel switching button is made by a rise and down operation etc., when two or more button grabbing performs channel specification of two or more figures, for example. When based on the up-and-down operation, channel selection is made for the multiple-times operation of the button +1 or by taking -1, and selection operation of the target receiving channel is carried out.

**0083** When a channel change is made by such operation, whenever a channel changes, disorder arises in a video signal as mentioned above. Then, when a channel switching button is operated continuously many times, the meantime is made into the period which displays the image of a pause condition and continuation channel change operation is completed in this way, The cash rec/play image over the receiving channel signal chosen eventually is displayed.

**0084** And the field in which cache reproduction is possible, i.e., the past image section which can be displayed while carrying out time shifting continuously, is made into a field (13), and specification is updated for the starting point of the section, for example in the position of \*\* from cash reproducible position **of the channel A** \*\*.

**0085** Thus, the equipment which can perform cash rec/play can be constituted, operating a receiving channel. Although the number of receiving channels at that time described 1 as an example, it can also constitute the equipment which records those input signals, receiving the signal of two or more channels using a hard disk with a quick access speed.

**0086** In that case, what is necessary is just to also depend channel setting when such on the same method and composition, although it has two or more Records Department 50 or the function which records two or more bit streams on the hard disk 63 by frequency division operation etc. receiving two or more input signals etc. is realized.

**0087** As mentioned above, although the signal broadcast was received and the composition and its operation of the recording and reproducing systems of a video signal which perform cash rec/play, and a video-signal recording and reproducing device were described, There is the method of constituting the regenerating section 70 as a video signal recorder which comprises the Records Department 50 and the medium part 60 in the video signal recorder 40 as video-signal playback equipment.

**0088** The equipment which installs those video signal recorders and video-signal playback

equipment in a different place, and is installed in those distant places is a case where join together by a home network etc. and it is made to operate.

**0089**The video signal recorder at that time is made into a home server, and is installed in a home, video-signal playback equipment is connected to the home server by a home network, and the video-signal playback equipment is installed as two or more set top boxes for every room in which a monitor TV is installed.

**0090**In this case, that home server as a bit stream sending device, A set top box is constituted as a bit stream receiving terminal, The video-signal information recorded on a hard disk while it is combined by high-speed wireless LAN or home LAN and both perform two-way communication by the operating instructions from each part store. Monitor TV to which the target bit stream views and listens via the set top box which a user operates is supplied, and it is made to be displayed in the decoded video signal.

**0091**Thus, the recording equipment and the regenerating section as a transmit terminal and a receiving terminal are installed in the distant place, and when making it operate unitedly by a means of communication, two or more transmit terminals and two or more receiving terminals will constitute the network form visual system which is combined in a network and operated.

**0092**Although the recording medium used for a medium part was described centering on the hard disk, a recording medium is applicable also to the equipment using other recording media, such as the medium in which rapid access is possible, for example, a magneto-optical disc, a RAM form or DVD or RW form, and a semiconductor memory form recording medium.

**0093**Although MPEG-2 system was described as an example, the coding mode of a video signal, The method of compression encoding may use the compression method of the method not only by this but the formation of a frame inner code commonly called Motion-JPEG or MPEG-4 system, MPEG-7 system, MPEG-21 system with which standardization will be started from now on, and other fractals.

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#### **Brief Description of the Drawings**

**Drawing 1**It is a schematic block diagram of the video-signal recording and reproducing device concerning working example of this invention.

**Drawing 2**It is a figure showing the structure of the frame signal which a motion compensation is made by MPEG-2 system and coded.

**Drawing 3**It is a figure showing typically the bit stream under cash rec/play concerning working example of this invention.

**Drawing 4**It is a figure showing typically the state of the image displayed at the time of the channel change concerning working example of this invention on a time-axis.

**Drawing 5**It is the figure illustrated about the method of presentation of a display at the time of the channel change concerning working example of this invention.

#### **Explanations of letters or numerals**

40 Video-signal recording and reproducing device

50 Records Department

51 TV tuner

52 A/D converter

53 MPEG-2 encoder

54 Stream analyzer

55 REC-FIFO

56 Header detector

57 Microcomputer

58 Temporary storage memory

60 Medium part

61 Hard disk record reproducer

63 Hard disk

65 Write-in reading control machine

70 Regenerating section

71 Buffer memory

72 MPEG-2 decoder

73 OSD

74 D/A converter

76 Microcomputer

78 Temporary storage memory  
79 Remote control interface  
90 Monitor TV  
95 Remote control

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**Drawing 1**

For drawings please refer to the original document.

**Drawing 2**

For drawings please refer to the original document.

**Drawing 3**

For drawings please refer to the original document.

**Drawing 4**

For drawings please refer to the original document.

**Drawing 5**

For drawings please refer to the original document.

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For drawings please refer to the original document.

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